JUN -7 1955

JUNE, 1955

METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

FOUNDED 1903

Sect. 17

A. E. S. To Hold 42nd Annual Convention and Fourth Industrial Finishing Exposition
Complete Program and Exhibitors Section

JUN 9 - 1955

Surface Treatment and Finishing of Light Metals
Theory, Practice and Application of Aluminum Anodizing Processes

Standardization of Chromium Bath Tests on a Bent Cathode in the Hull Cell
A New Method for Evaluating Covering Power

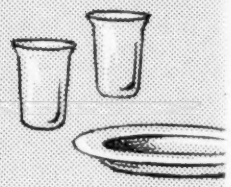
Science for Electroplaters
Isotopes

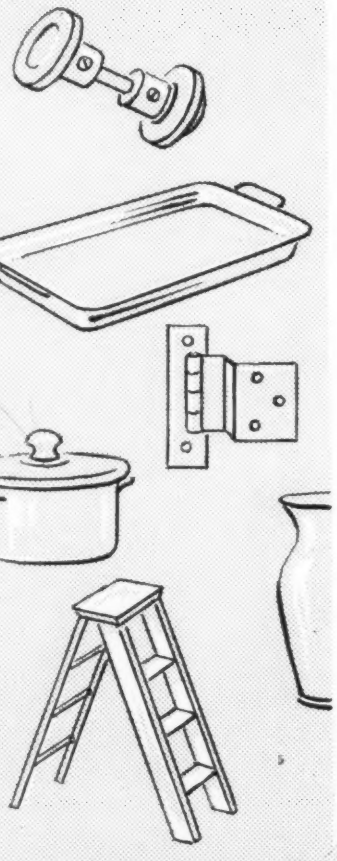
Complete Contents Page 73

WHERE PLATERS AND FINISHERS LOOK FOR INFORMATION
WESTWOOD, N. J.
FINISHING PUBLICATIONS, INC.

READ & PASS ON

CLEPO PRODUCTS *For the* ANODIZING DEPARTMENT





Have you a PROBLEM in your anodizing work? if it is cleaning, we would recommend for your consideration

CLEPO 86-P — A non-etch type Alkaline soak cleaner

CLEPO 30-R — An etch-type non-scaling alkaline cleaner.

CLEPO 85-AN — A non-etch type Alkaline washing machine cleaner.

CLEPO 120-K — An acid type de-smutting compound used after etching.

If it is stripping we suggest . . .

CLEPO 195-A — An acid type material, used cold, non-fuming, rapid, with minimum attack on the base metal.

If you have no particular PROBLEM.

but want to keep up to date, we would suggest a simple, inexpensive, rapid new process for cleaning Aluminum before anodizing and for stripping racks in one chemical operation. Lettering, Dirt, Oil, Water Stains, corrosion and anodized coatings are removed rapidly with negligible attack on the base metal.

Your CLEPO Service man will be glad to demonstrate these materials for you.

FREDERICK **GUMM** *Chemical Company Inc.*

538 FOREST STREET, KEARNY, N. J.

CLEPO — CLEANING COMPOUNDS

New PRODUCTS FOR METAL FINISHING

through *Enthonics**

At Enthone, continuous research by chemists and metallurgists provides a steady flow of new products that make it possible to overcome successfully — *and economically* — the problems that are created by the everchanging requirements of the metal finishing industry.

CHROMEKILL 4A

Reduces hexavalent chromium in alkaline cleaning solutions — both soak and electrolytic — to guard against blistering, peeling, poor throwing power and, in some cases, complete absence of plate. Chromekill 4A provides a "dual action": certain ingredients accomplish fast reduction when serious trouble must be remedied immediately while slower acting reducers assure long-time protection against future contamination. Chromekill 4A can also be used for reducing hexavalent chromium in certain alkaline plating solutions.

ENSTRIP CR-5

An effective acidic type stripper for rapid stripping of heavy chromium deposits from steel, nickel, copper base alloys, stainless steel and aluminum. The stripping rate varies from .005" to .010" per hour depending upon temperature and age of solution. Enstrip CR-5 is inhibited to prevent attack on the base metals.

ALUMINUM CLEANER NE-6

NE-6 has very high detergency and unusual ability to disperse oils and remove marking ink and crayon from aluminum sheet. Mild in alkalinity, it does not etch aluminum at the air interface or in contact with other metals. Recommended for cleaning aluminum preparatory to anodizing, plating, chromate treatments and resistance welding.

ENAMEL STRIPPER S-18

A solvent type, slightly acidic enamel stripper, S-18 removes enamel from copper, copper alloys, steel and aluminum through a wrinkling action. This stripper is well-suited for removing most Epon or Epoxy coatings as well as synthetic enamels such as phenol formaldehydes, urea formaldehydes and melamine. Immersion in S-18 wrinkles or loosens the coating — and a water rinse quickly loosens any remaining enamel. Stripper is nonflammable.

Drop us a line for details on these products and check list of available literature on more than 60 products and processes for modern metal finishing.

**The Scientific Solution of Metal Finishing Problems*

ENTHONE INCORPORATED

METAL FINISHING PROCESSES

442 ELM STREET, NEW HAVEN, CONNECTICUT

ELECTROPLATING CHEMICALS

SERVICE REPRESENTATIVES AND STOCK POINTS

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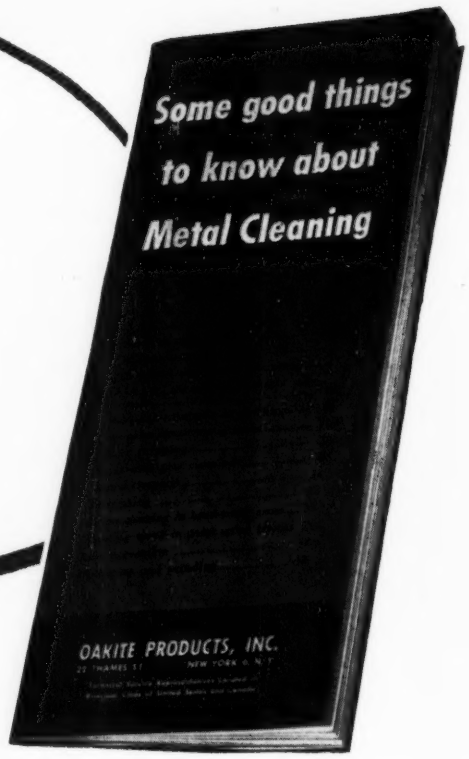
WHICH OF YOUR METAL-CLEANING JOBS WOULD YOU LIKE TO IMPROVE?



¶ Are you cleaning metal in the most economical way? *See page 9 of Oakite's* FREE *booklet on Metal Cleaning.*

¶ Are you cleaning metal the fastest way? *See page 11.*

¶ Can you clean brass anodically with no tarnish? *See page 18.*

¶ Can you clean steel and prepare it for painting for less than 20 cents per 1,000 square feet? *See page 24.*

¶ Do you need a cleaner that removes rust and oil at the same time; often eliminating all need for pickling? *See page 28.*

¶ How do you clean parts that are too large to be soaked in tanks or sprayed in machines? *See page 30.*

¶ Does your burnishing barrel produce high luster? *See page 32.*

¶ What do you do when oversprayed paint neither floats nor sinks in your paint spray booth wash water? *See page 35.*

¶ Would you like to eliminate expensive drying from your anti-rust procedure? *See page 37.*

LISTED BELOW are some of the operations discussed in this 44-page illustrated booklet. Please check the jobs in which you are interested. Then let us show you how Oakite methods can give you better production with greater economy.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC., 18 Rector Street, New York 6, N. Y.

Tell me about Oakite methods and materials for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning steel
- ☐ Electrocleaning non-ferrous metals
- ☐ Pickling, deoxidizing, bright dipping
- ☐ Pre-paint treatment
- ☐ Zinc phosphate coating
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention
- ☐ Treating water in paint spray booths
- ☐ Machining and grinding
- ☐ ALSO send me a FREE copy of your booklet "*Some good things to know about Metal Cleaning*"

Technical Service Representatives in Principal Cities of U. S. and Canada

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*Company*_____

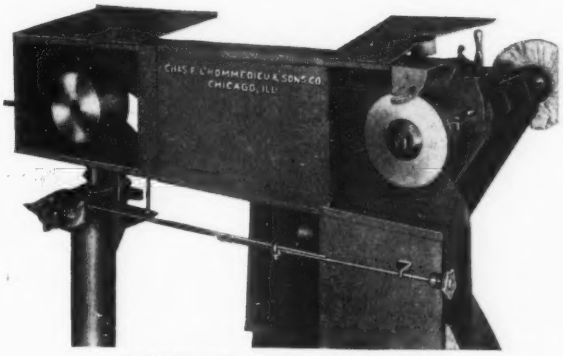
*Address*_____

Metal Finishing is published monthly by the Finishing Publications, Inc., 381 Broadway, Westwood, New Jersey, U.S.A.
Entered as second class matter at the Post Office in Westwood, N. J. Volume 53, No. 6, June, 1955. Four Dollars Per Year.

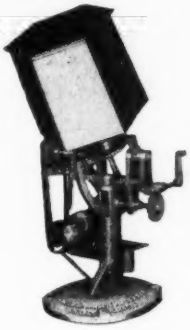
USE "RELIANCE" PRODUCTS FOR

ECONOMY : EFFICIENCY : DEPENDABILITY

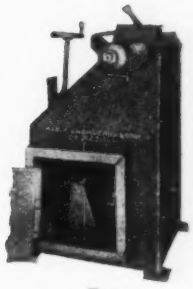
WRITE FOR FURTHER DETAILS



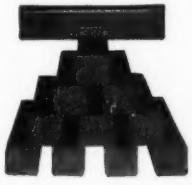
BACKSTAND IDLER WITH LATHE



OBLIQUE
TUMBLING BARREL



#23A
POLISHING LATHE



EXTRUDED COMPOSITIONS
STANDARD SIZE
2 x 2 x 10"

NUWAY BUFFS FOR
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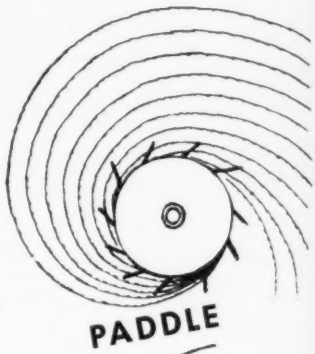

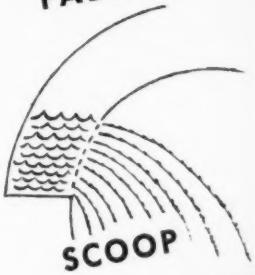

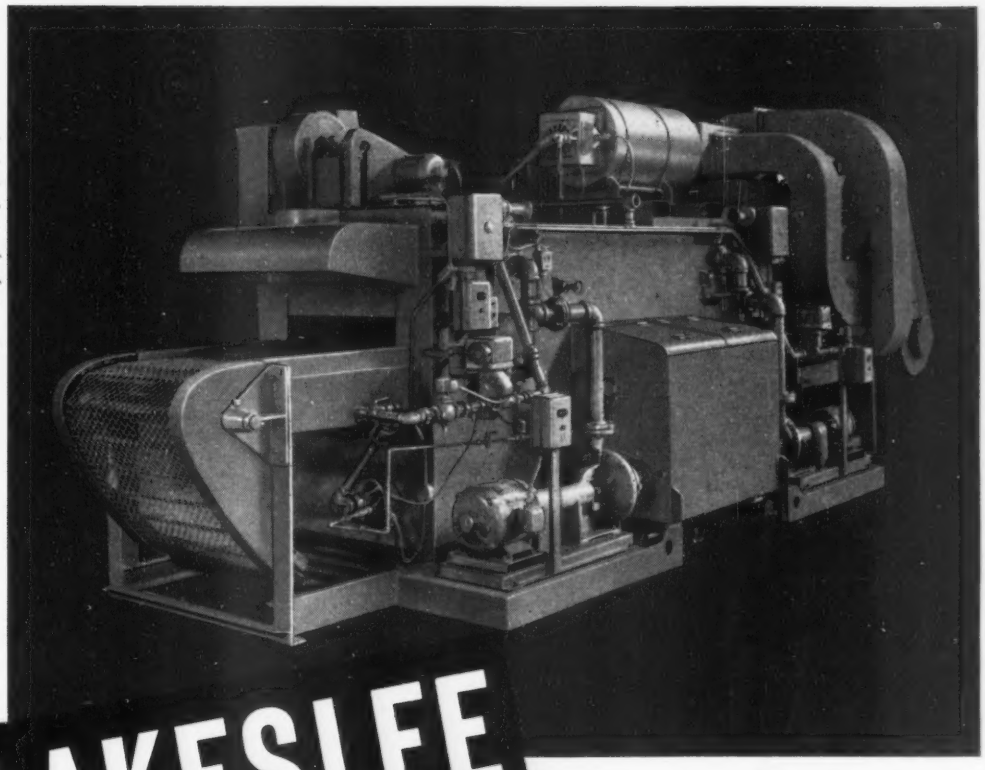

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Since 1880
75th Anniversary

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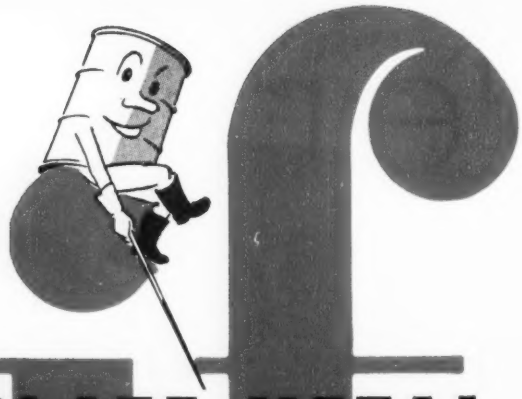
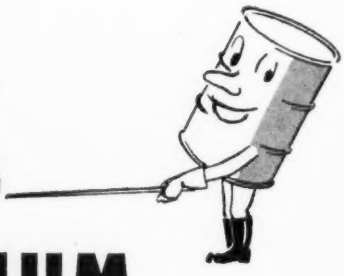




● YOU PLATE METAL
● YOU PAINT METAL
● YOU WELD ALUMINUM
● YOU STRIP ORGANIC FINISHES

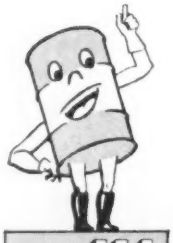
NORTHWEST'S CHEMICALS DO IT BETTER!

Remember — YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER

Northwest's years of research in formulating and perfecting analytically correct, job-adjusted cleaners are your assurance of the right chemical for your job.

Northwest's Metal Cleaning Specialists have at their command such outstanding processes as LO HI pH — for cleaning prior to plating, painting or vitreous enameling; ALKALUME — for preparing aluminum for finishing and spot welding; INTERLOX — for phosphate coating; SPRA-LUBE — to control overspray of "todays" paints in water-wash paint booths; PAINT STRIPPERS — specific to your needs; SUPER-DRAW AND FLUID FILM — for drawing metals.

Northwest's production-tested chemicals and "Right the First Time" recommendations will save you money. Your Northwest Cleaning Specialist is as close as your phone.



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pioneers in pH cleaning control serving you since '32

5 Rapid Selenium Rectifiers form Power-Packed Line-up at Warner & Swasey

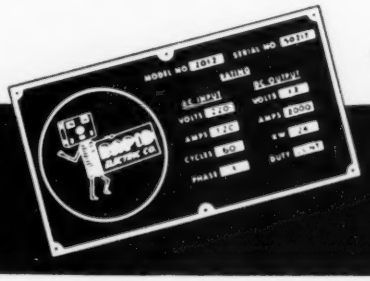
Warner & Swasey's chromium plating installation features a power-packed line-up of five Rapid Selenium Rectifiers. It's Rapid power, then, along with extensive know-how and other excellent equipment that helps Warner & Swasey turn out only quality chromium plating which is in keeping with their reputation for building the finest of precision, metal-turning machine tools.

"Multiple Rapid" installation such as this are not uncommon. Because, once a plater buys a Rapid Rectifier, he almost always buys more as his power needs increase. Additional Rapid Rectifiers are specified because of the complete satisfaction derived from the efficient, dependable, low cost performance of the original unit. It is this feeling of satisfaction on the part of our plating customers that is responsible for Rapid's growth in the industry.

Plating men know that when they specify Rapid for their DC Power needs, they are getting first of all, an engineered DC power supply which gives them six square inches per ampere of plate surface and many other "plus" features, such as:

- **Long-time service**
- **High efficiency**
- **No lost time due to burnouts**
- **No loss of efficiency due to overheating**
- **No supervision needed**
- **No maintenance needed**
- **Maximum Safety Features**

Our engineering department is available for consultation on any application of Direct Current Power Supplies. Avail yourself of this professional service without obligation.



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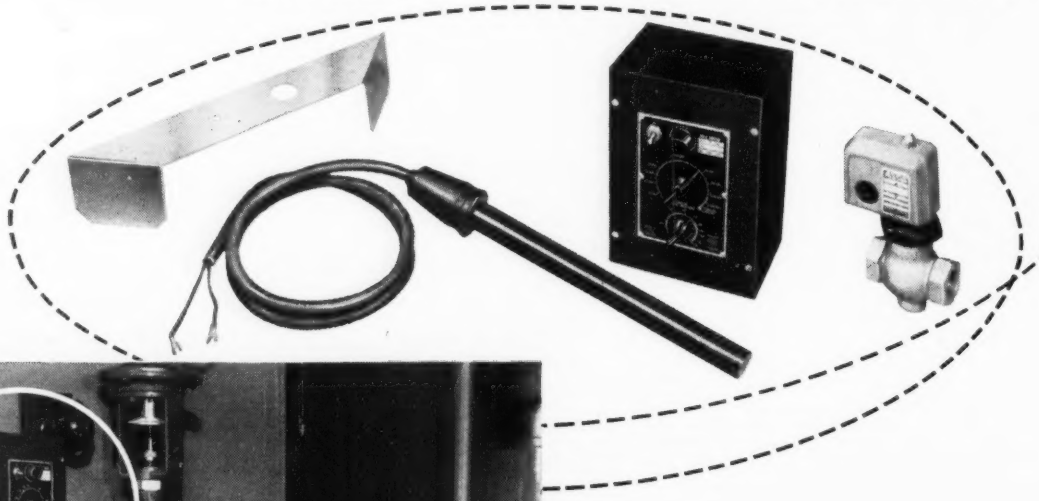
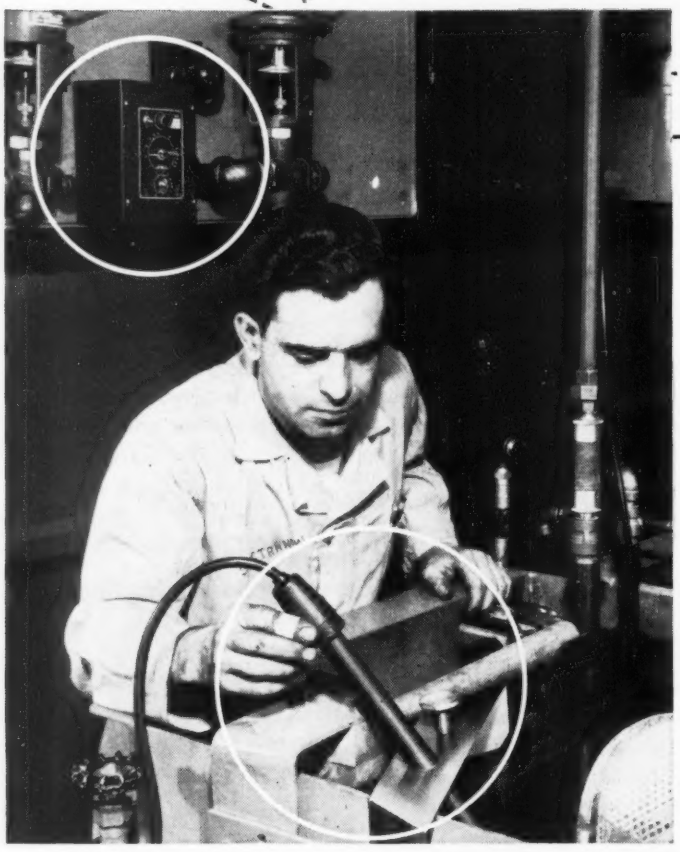
SLASH YOUR WATER BILLS...

SOLU BRIDGE *Automatic*

RINSE TANK CONTROLLER



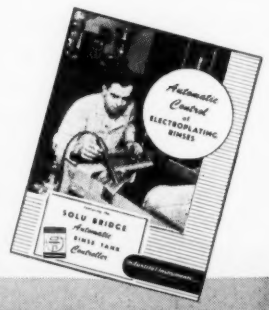


Water savings effected by a **Solu Bridge Automatic Rinse Tank Controller** installation are frequently more than 50%. An Eastern gold-plating plant, for instance, has reduced its water bill by a rate exceeding $10,000 per year.

Furthermore, because of serious water shortages in many areas, as well as the growing influence of Federal Law No. 845 (making stream pollution a Federal responsibility), there is sharply increased interest by platers in the batch treatment of collected rinse waters.

The Complete Kit 1-1 shown above. Conductivity Cell is placed in rinse tank. Solu Bridge (conveniently located) automatically turns on and off a water valve for given degree of rinse. Typical installation at left.

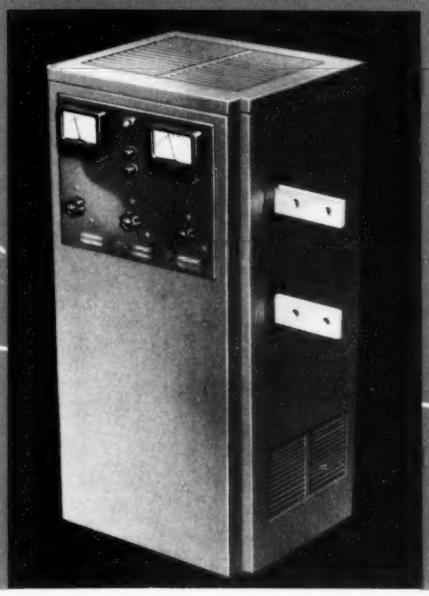
GET YOUR COPY...



Descriptive bulletin gives working details and economics. Ask your supplier to show you this remarkably inexpensive equipment. Or write us. A post-card will do.

Industrial Instruments INC.

89 COMMERCE ROAD, CEDAR GROVE (ESSEX COUNTY), N. J.



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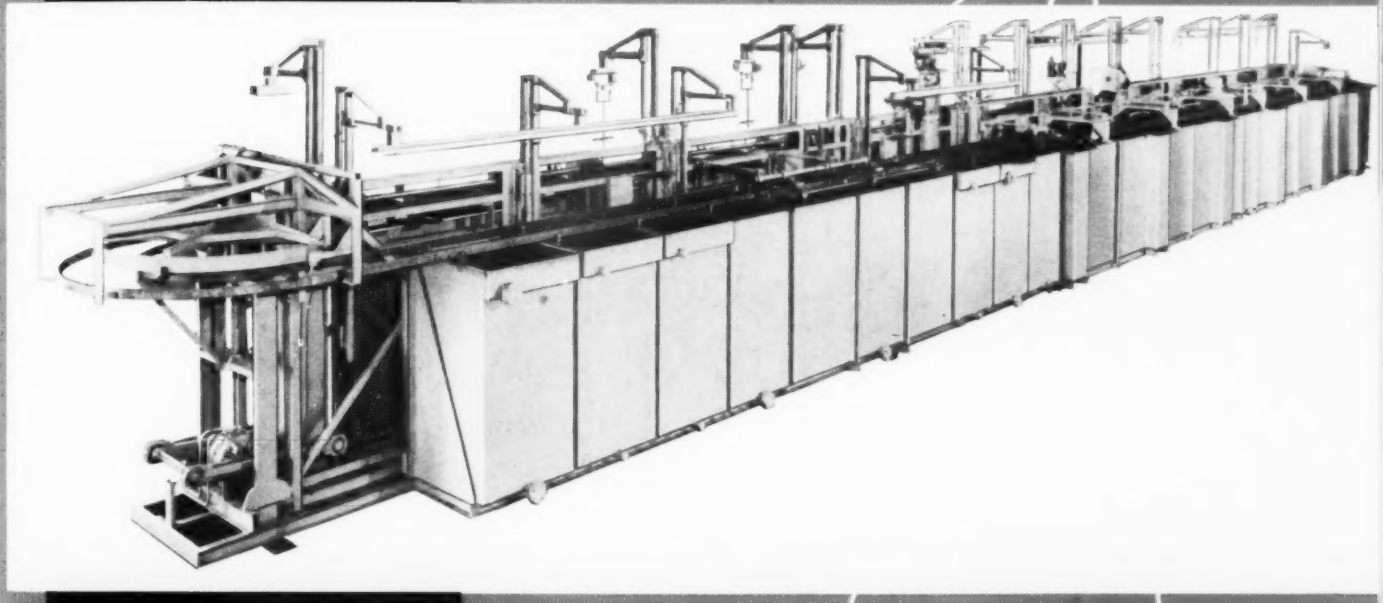
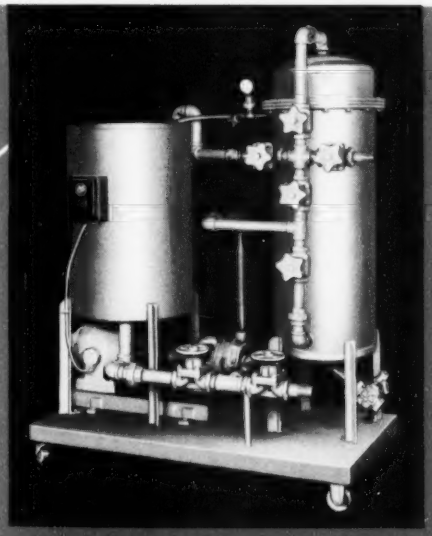
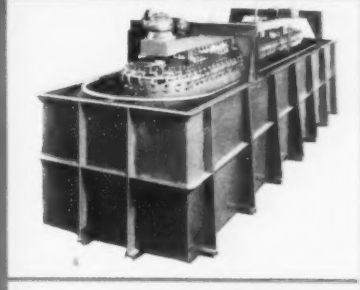
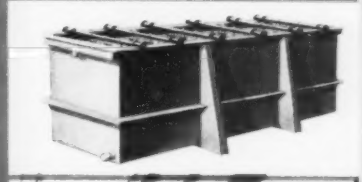
WAGNER BROTHERS
automatic plating equipment and supplies





RECTIFIERS
AUTOMATICS
SEMI-AUTOMATICS
FILTERS
TANKS & LININGS
ANODES
WASTE TREATMENT SYSTEMS





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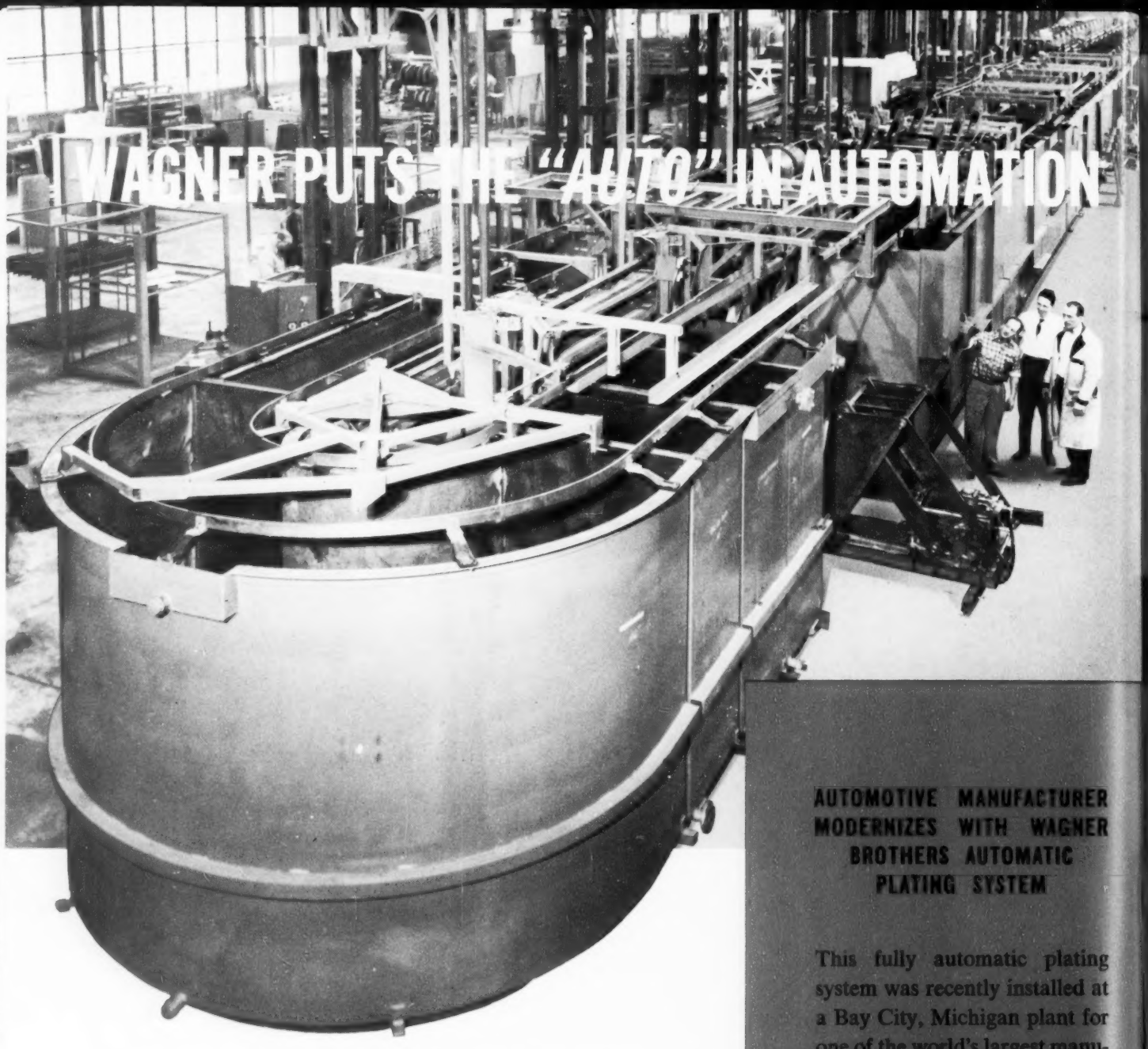
WAGNER PUTS THE "AUTO" IN AUTOMATION



If your metal finishing operations are still being carried on with obsolete equipment which loses money for you every day, we can put you ahead of your competition, increase your profit margin.

Increased production lowers the unit cost of your parts processing operations – you spend less for labor, less for power and increase your capacity to handle more business.

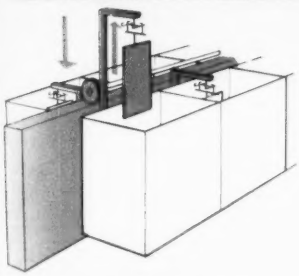
Wagner Brothers Full Automatic* Electroplating systems offer you a new and revolutionary concept in high-volume plating mechanisms – the product of years of engineering research and design refinements – for completely automatic cycling of your metal finishing operations.

*Patents Pending

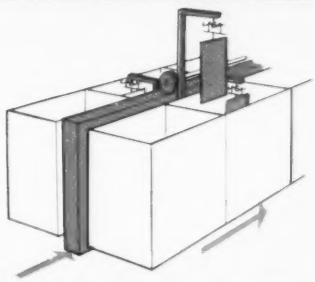
Basic design details of Wagner Brothers Automatic Plating systems are described and illustrated in Bulletin 50-54, available free upon request.

AUTOMOTIVE MANUFACTURER MODERNIZES WITH WAGNER BROTHERS AUTOMATIC PLATING SYSTEM

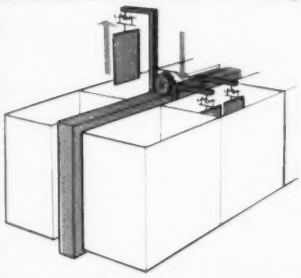
This fully automatic plating system was recently installed at a Bay City, Michigan plant for one of the world's largest manufacturers of passenger cars. The unit is 203 feet long, 11 feet wide and operates under 16-foot head-room. Die cast parts are continuously processed through a 40 station copper-nickel-chromium cycle. Production rate is 100 racks per hour, using racks 24″ long, 10″ wide and 64″ deep. Power is furnished by one 25-HP motor. Unit is provided with a push-button central lubrication system, built-in rack stripper, vertical and horizontal agitation. Racks are automatically loaded unloaded.



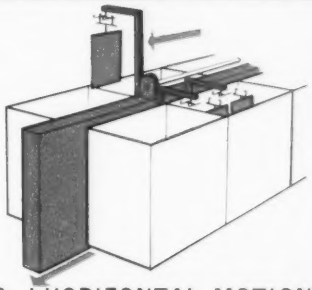
1st VERTICAL MOTION



1st HORIZONTAL MOTION



2nd VERTICAL MOTION



2nd HORIZONTAL MOTION

HOW IT OPERATES

All transfer and conveying mechanism is mounted on a reciprocating carriage located between the two rows of tanks. Two basic movements bring parts through the full plating cycle, one forward and reverse straight line horizontal motion and one raising and lowering vertical movement.

Plating racks are attached to work-carriers at the loading station, When the machine is started, lifting arms fixed to the carriage engage the work-carriers being transfered and lift them at all points on one side of the machine, carry them forward to the next station where they are lowered and disengaged from the lifting arm. Sequence is simultaneously produced in reverse on the opposite side so that, when lifting arms are lowered on one side, they rise on the other side.

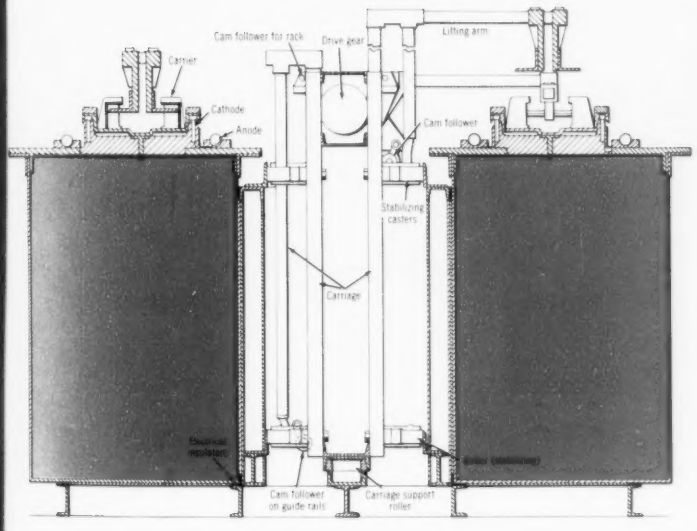
ADVANTAGES and FEATURES

SMOOTH OPERATION — Hydromotor power principle *eases* parts through the plating cycle without jolting starts and stops. Parts never jar from work-carriers into tanks.

LOW POWER NEEDS — Almost perfect balance of work load being lifted at one time requires only *low hydraulic pressures.* One 25-HP motor operates the 203 foot automatic shown.

SIMPLE INSTALLATION — Automatics are delivered to your plant either intact or in 2 or 3 completely assembled sections, depending upon size. *You avoid costly installation.*

MINIMIZED MAINTENANCE — There are fewer moving parts, no vibrating parts, no backlash in automation, low hydraulic pressures, no alignment problems. Overload protection is built into the hydraulic pump. Working parts are easily reached without disassembly.



The entire carriage mechanism is suspended on rollers moving in an oil-filled channel track. This carriage is motivated by a hydro-motor mounted at the base of the machine, fitted with a crank and link to translate the simple harmonic motion of the motor shaft to the in-line reciprocating action of the carriage.

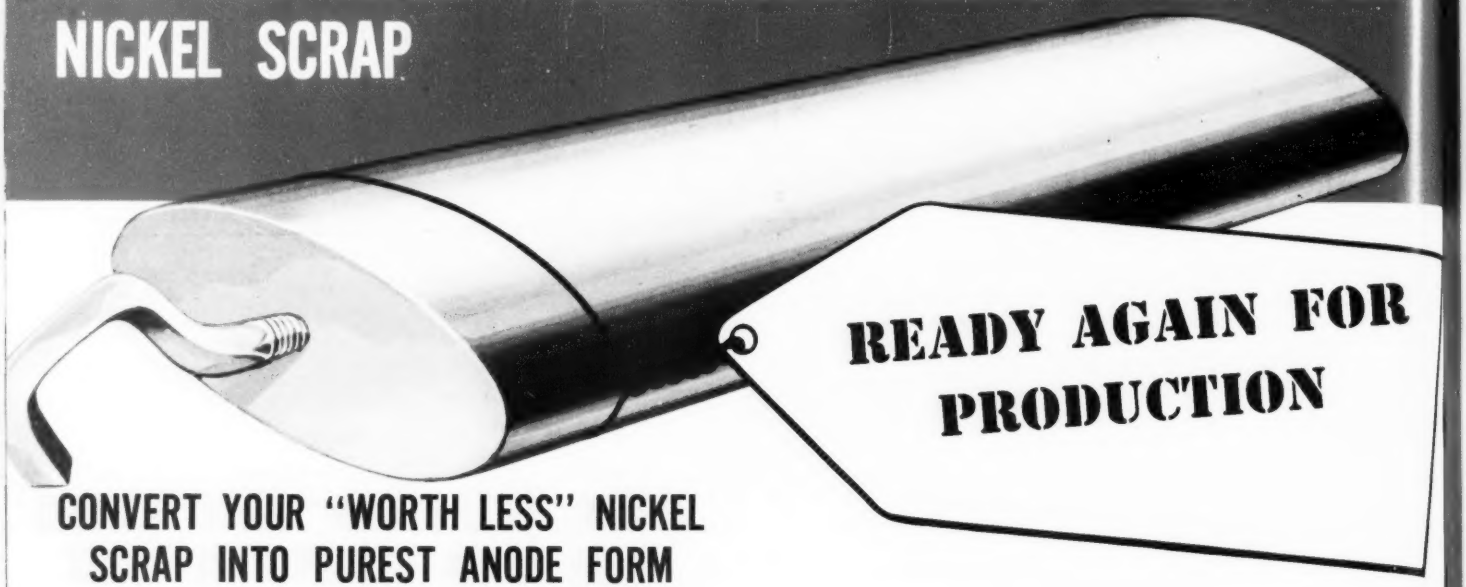
OTHER FEATURES —

OPERATES UNDER LOW HEAD-ROOM REQUIREMENTS • NO OIL-DRIPPING CONNECTIONS OVER TANKS • TRIPLE CONTACT CATHODE BARS FOR SMOOTH CURRENT FLOW • AUTOMATIC HEAT CONTROL FOR ACCURATE RESULTS • CENTRAL LUBRICATION SYSTEM • EASILY VARIED DRAG AND DWELL TIME

In addition to high-volume plating, the Wagner Brothers Automatic is equally-well-suited to anodizing (sulfuric and chromic), phosphate coating, etching, electropolishing, oxide coating, etc.

WAGNER
BROTHERS, INC.
100 MIDLAND • DETROIT 3, MICH.

ELECTROLYTICALLY PURE ANODES RECAST FROM *YOUR* NICKEL SCRAP



CONVERT YOUR "WORTH LESS" NICKEL SCRAP INTO PUREST ANODE FORM

A scrap bin full of useless ends, swords and stubs is "worth less" to you. But we can convert this valuable nickel into production-ready anode form, save you dollars you'd lose selling scrap to dealers and purchasing new nickel anodes.

HERE'S HOW WAGNER NICKEL RECASTING CAN BENEFIT YOU

1. **ELECTROLYTICALLY PURE ANODES** – We have a long established reputation for recasting under strictest metallurgical controls – your assurance of 99% pure nickel anodes.
2. **YOUR SCRAP, YOUR ANODES** – You get your own metal back. We do not pool scrap shipments but process each job with individual attention.
3. **MODEST HANDLING CHARGE** – You'll be amazed at how inexpensive it is to turn now "worth less" scrap into good anodes. Our fair prices have made us a leading supplier to the major job plating and manufacturing companies in the metal finishing industry.
4. **READY FOR IMMEDIATE PRODUCTION** – We'll return your nickel scrap in oval cast shapes, to the length you specify, tapped and drilled for hooks.

A WORD OF CAUTION

Unless you are *absolutely sure* of your metal broker, we advise against buying nickel scrap of dubious quality. We reserve the right to refuse junk scrap.

CONSULT YOUR NEAREST WAGNER REPRESENTATIVE OR OUR HEAD OFFICE NOW FOR AN IMMEDIATE QUOTATION

POPULAR WAGNER ANODE FORMS

COPPER	NICKEL	ZINC	TIN	BRASS	TIN-LEAD	TIN-ZINC	CADMIUM	ANODE
●		●		●				FLAT-TOP*
●	●	●	●		●	●		ISOCAST OVAL
			●			●	●	CAST BALL
●			●		●			ISOCAST SLAB
●								LECTROCOP†
●								FORGED BALL

†TRADE-MARK *REGISTERED TRADE-MARK

MAIL

WAGNER BROTHERS, INC.
400 Midland Ave.
Detroit 3, Michigan

I'd like more information describing the products checked.

- ☐ Full Automatic Plating Systems
- ☐ Semi-Automatic Platers
- ☐ Electroplating Rectifiers
- ☐ Plating Solution Filters
- ☐ Tanks and Linings
- ☐ Anodes
- ☐ Nickel Brighteners
- ☐ Waste Treatment Systems
- ☐ Nickel Recasting

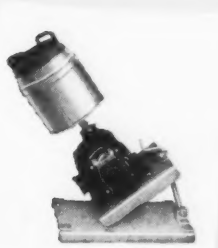
LITHO IN U.S.A.

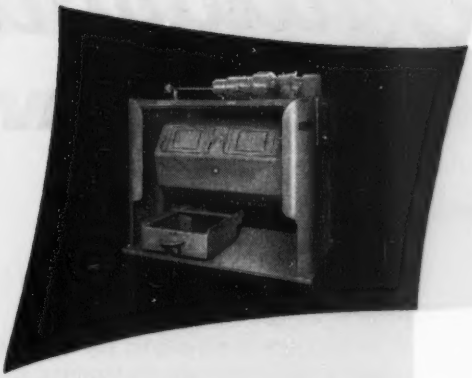
NAME_____ TITLE_____

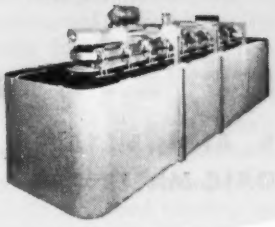
COMPANY_____

ADDRESS_____

CITY_____ STATE_____

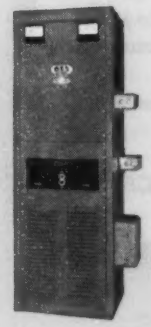


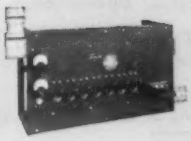


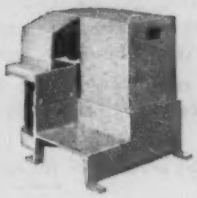


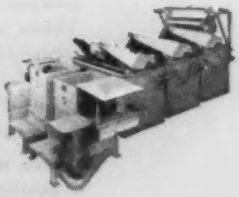
CROWN ***equipment***

- Automatic Machines for Plating-Anodizing, etc.
- Dryers, Centrifugal
- Partially Automatic Plating Machines
- Plating Barrels
- Rectifiers
- Rheostats, Switches — Controls
- Tray — Transfer Type Cleaning — Rinsing — Dipping Units
- Tumbling Barrels — "Horizontal" — "Tilting"
- Special equipment designed and built









COMPLETE DETAILS SENT PROMPTLY ON REQUEST

CROWN RHEOSTAT AND SUPPLY COMPANY

3465 N. KIMBALL AVENUE • CHICAGO 18, ILLINOIS

SEE Industrial's AT THE A.E.S.

COMPLETE WASTE TREATMENT SYSTEMS

- **PROFITABLE RECOVERY OF VALUABLE ACIDS AND METALS.**
- **LOW COST DESTRUCTION OF CORROSIVE AND TOXIC MATERIALS.**

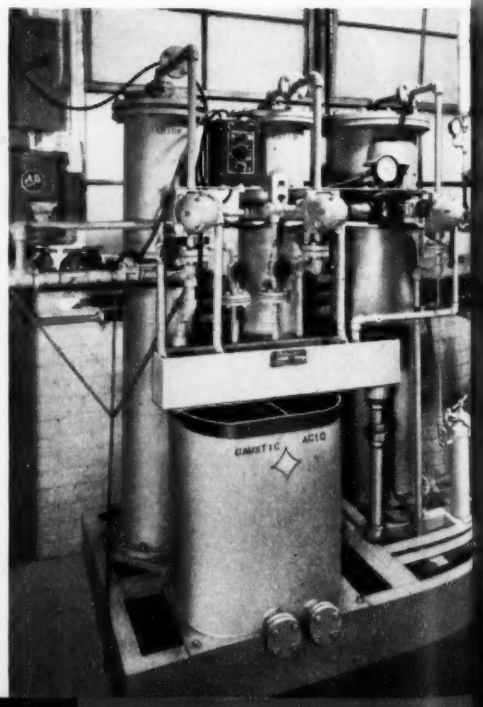
SEE A WORKING MODEL OF A CHROMIC ACID RECOVERY SYSTEM
In our booth you will see why Industrial's Ion-Exchangers can pay for themselves in a few months. Besides the value of the chromic acid recovered, the continuous operation eliminates down time for replacement of solution and simultaneously produces a high quality of purified water.

The unit at the right is used by the Sunbeam Corporation for recovery of gold and nickel from plating rinses . . . and is only one of the many ways to *profitably* treat acid wastes. In many cases treatment of process solutions with Industrial ion-Exchangers will prevent their becoming waste.

SEE WORKING MODEL OF CHROMIC ACID DESTRUCTION SYSTEM
Where recovery is not economically practical . . . Industrial's *completely packaged* destruction systems are recommended. These units produce non-toxic waste water at the lowest possible cost. In addition to chromic acid, a wide variety of harmful wastes can be treated with Industrial systems. They cost little to operate and can be designed for continuous automatic, semi-automatic and manual operation.

These are only two of the many waste treating systems Industrial designs and builds to suit the job.

GET FULL DETAILS ON INDUSTRIAL'S COMPLETE SERVICE



Industrial

INDUSTRIAL
FILTER & PUMP MFG. CO.
5924 Ogden Avenue • Chicago 50, Illinois

CENTRIFUGAL PUMPS
PRESSURE FILTERS
DEMINERALIZERS
ION EXCHANGERS
HEAT EXCHANGERS
RUBBER LININGS
WASTE TREATING EQUIP'T

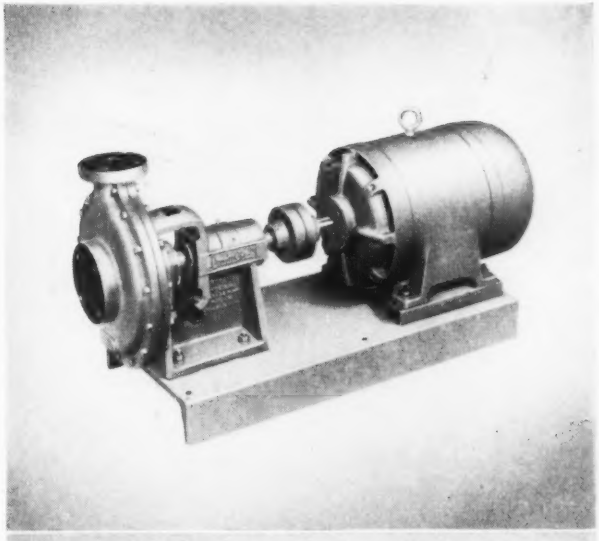
NEW EQUIPMENT
CONVENTION IN CLEVELAND

NEW IMPROVED CENTRIFUGAL PUMPS...
CUT-AWAY WORKING MODELS

See how Industrial protects pumps from corrosion with thick permanently bonded rubber linings ... and a corrosion-proof stuffing box. These pumps are designed specifically for rubber lining and are built and lined entirely at Industrial. By having its own rubber division, Industrial is able to compound the exact formulas of rubber and synthetics best suited to resist the corrosive fluids used in the plating industry.

See how Industrial beats vibration problems with its precisely balanced rotating unit ... a very short thick shaft to prevent oscillation... and large combination radial and thrust ball bearings which are permanently lubricated.

Industrial's rubber lined pumps offer a far wider range of use than any metal pumps. Our engineers will be glad to give you full data on resistance to corrosive and abrasive materials of all kinds.



SEE THE LUCITE WORKING MODEL OF
INDUSTRIAL'S NEW HORIZONTAL FILTERS

These HORIZONTAL filters will set a new standard of convenience and performance for the plating industry.

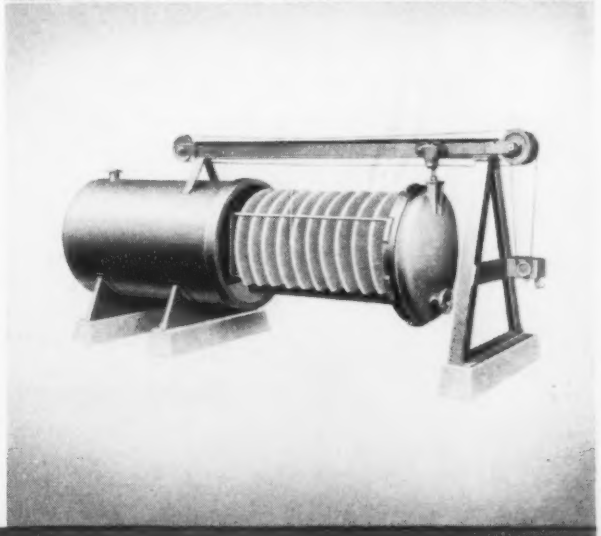
In our transparent model you will actually see the uniform buildup of cake on the filter leaves.

You can see how the head, leaves and manifold run out on a track for exceptionally easy recovery of wet or dry cake discharge.

When the filtration unit is out of the shell, take a look at the "lift out" filter leaves which simply snap in and out of place on the manifold, using an O-ring as a seal.

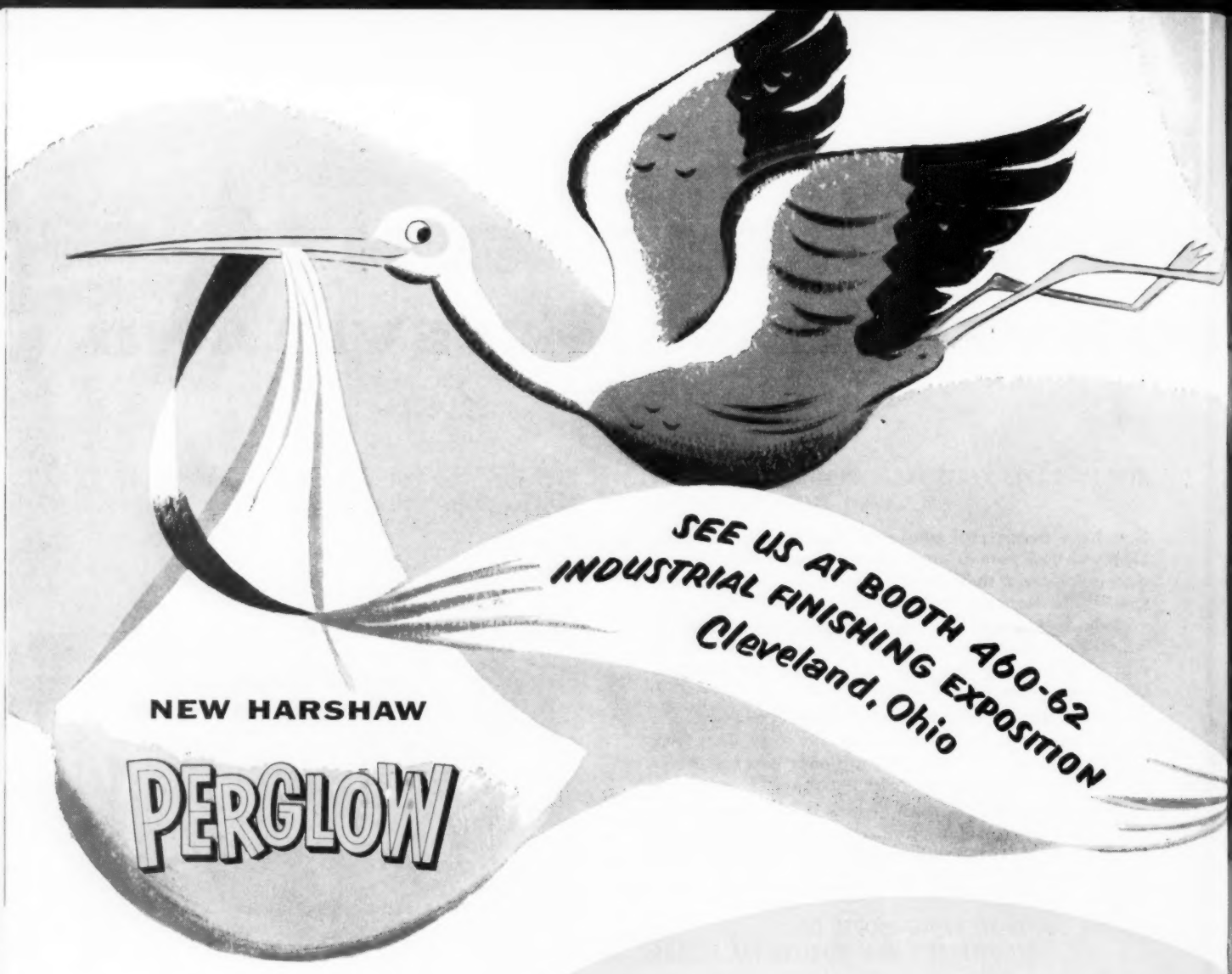
A rapid cleaning feature is available in the form of a vibrator for shaking off the filter cake.

Capacities from 10 to 1950 square feet of filtering area ... and Industrial filters can be made in a wide range of materials or lined to suit your needs.



... AND OTHER PRODUCTS INTRODUCED TO THE PLATING INDUSTRY FOR THE FIRST TIME.

Industrial WILL BE IN BOOTH NO. 220
CLEVELAND PUBLIC AUDITORIUM
JUNE 20th THRU 23rd



***Each* of these new outstanding Harshaw bright nickel plating processes has certain unusual characteristics which fit it to the product finish required in your plant.**

Top brightness with thin deposits . . . Especially outstanding color performance in applications where little or no basis metal finishing is done prior to plating. . . . Perglow or Nubrite deposits are extremely receptive to chrome plating . . . Unique leveling results of Perglow or Nubrite have a hiding and filling effect on surface defects which other nickel deposits tend to emphasize. Polishing costs are decreased.

For application in your plant, phone or write our nearest office.

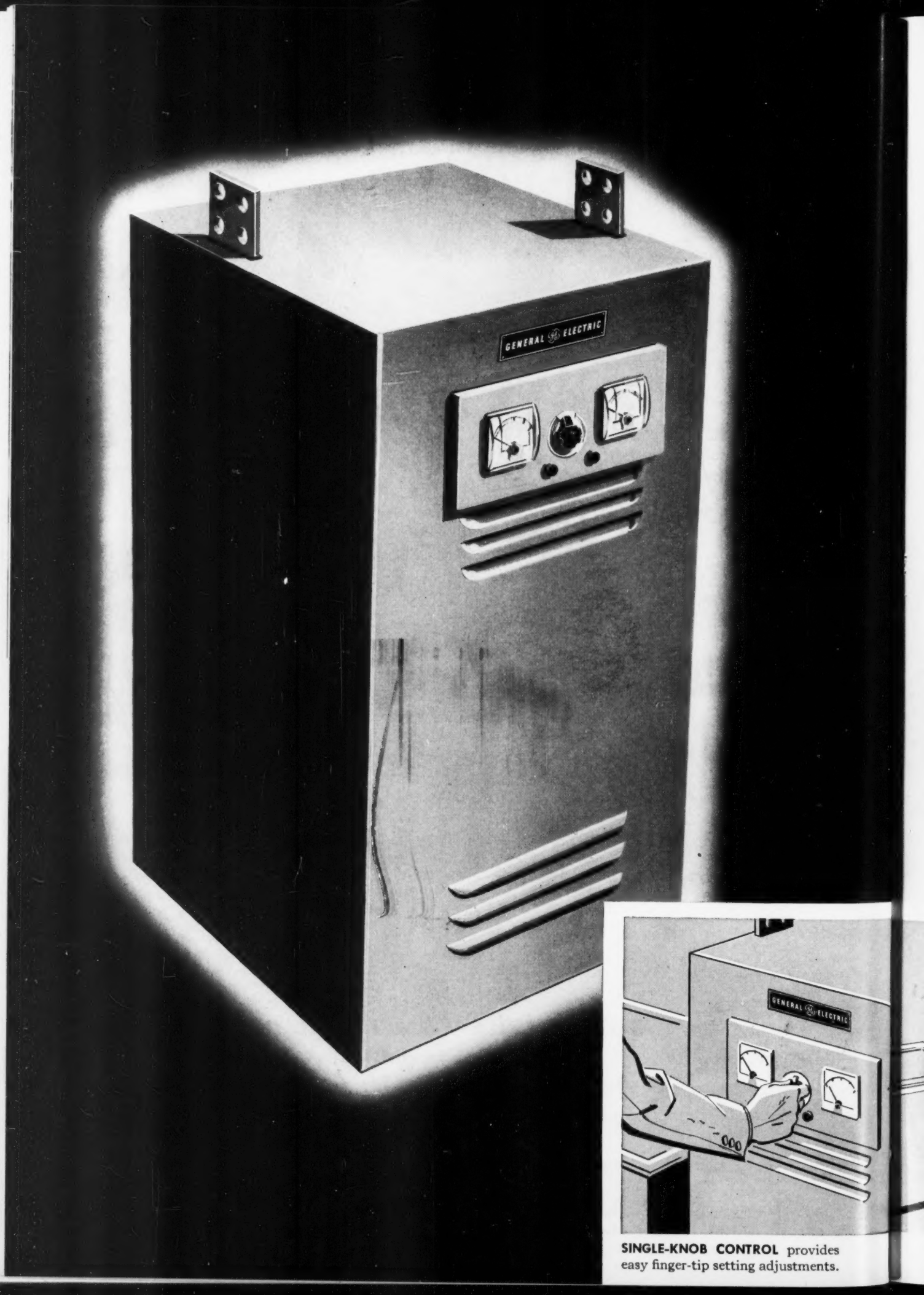
NEW HARSHAW

Nubrite

THE HARSHAW CHEMICAL COMPANY

1945 East 97th Street • Cleveland 6, Ohio

Chicago 32, Ill. • Cincinnati 13, Ohio • Cleveland 6, Ohio • Houston 11, Texas
Los Angeles 22, Calif. • Detroit 28, Michigan • Philadelphia 48, Penna.
Pittsburgh 22, Penna. • New York 17, N. Y.



SINGLE-KNOB CONTROL provides easy finger-tip setting adjustments.

GENERAL ELECTRIC ANNOUNCES

NEW Germanium Plater That Will Save You Money in Your Plating Operation

Now General Electric brings over four years of germanium experience into the plating field with a new 1000-amp plater that will make possible big savings in your plating operation. Designer and builder of more germanium units than all its competitors combined, G.E. offers you "XB"—experience bonus—along with economy of operation.

YOU SAVE MONEY in installation, operating, and maintenance costs with these new G-E germanium rectifier plating power supplies.

Installation costs are lower, because these compact, lightweight rectifier units need no special foundations.

Operating costs are greatly reduced by germanium's high over-all conversion efficiency*—90 per cent even at 12 volts d-c.

Extremely low maintenance costs in germanium platers result from a minimum of moving parts, and an absence of aging in the germanium element.

NEW G-E GERMANIUM PLATING POWER SUPPLIES feature down-draft air cooling, single-knob finger-tip control, and complete control flexibility. In addition, these 1000-amp, 12-volt units have smooth, stepless control, and hermetically sealed rectifier cells for long life in corrosive plating room environment.

G.E.'s down-draft air cooling draws air in horizontally through the front panel minimizing dust and dirt intake.

Single-knob finger-tip control means not only simplified adjustment, but elimination of multi-knob fumbling and possible transformer unbalance, as well.

Complete control flexibility permits the addition of automatic control in the future without necessitating complete replacement of the manual control.

To date, over 5990 kilowatts of G-E germanium rectifier power supplies are in operation—the equivalent of 1,000,000 amperes at six volts, the normal plating voltage—with another 5080 kilowatts on order. G.E. offers you real germanium know-how based on experience.

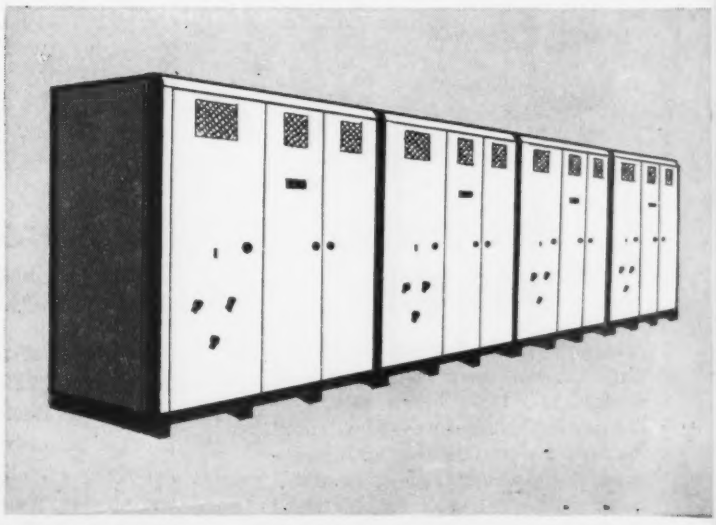
ADDITIONAL INFORMATION on G-E germanium plating power supplies is available from any authorized G-E plating agent, or by writing Section 463-12, General Electric Co., Schenectady 5, N. Y.

*Measured in accordance with recognized ASA, AIEE, and NEMA standards.

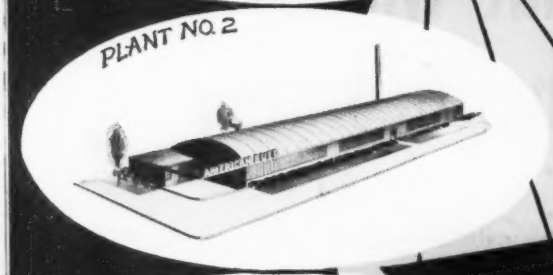
Progress Is Our Most Important Product

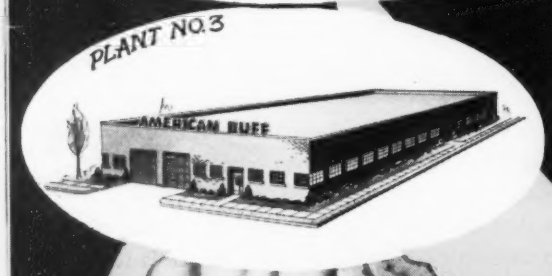
GENERAL ELECTRIC

EASE OF INSTALLATION, and the fact that only one side of the rectifier need be clear, helps eliminate layout problems.



"BIG BROTHER" of the new plating power supply, this germanium installation furnishes d-c power for anodizing operations.

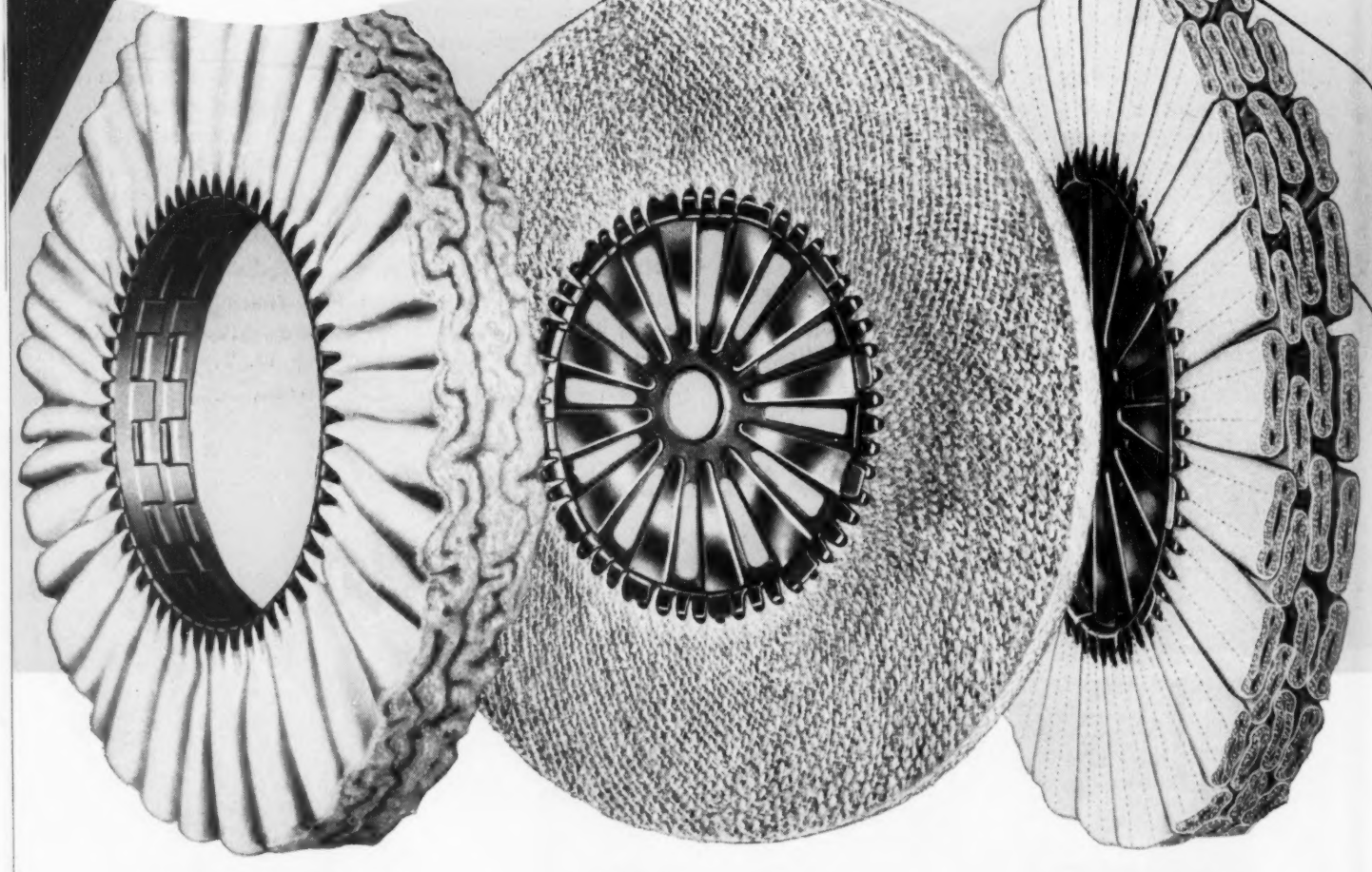




For the

Engineered to do MORE buffing Jobs BETTER!

From the world's largest buff manufacturing plants come the world's finest buffs! Every American Buff is carefully planned to answer the specific problems of the industry . . . expertly produced of the finest quality materials and workmanship. For variety to meet every need . . . for top performance . . . for outstanding economy . . . choose AMERICAN —you can't buy a better buff!



Automatic BIAS BUFF

This versatile buff does both cutting *and* coloring on a wide variety of metals. Like other American "Automatic" buffs, it features the patented *Centerless* construction with exclusive "Pre-Assembly". Also available with permanent steel or fiberboard centers.

Automatic BIAS SISAL BUFF

Top-quality *all-new* sisal gives this buff unmatched durability and fast cutting. Exclusive "permanizing" process actually *locks fibres together* . . . eliminates scratching and fraying. Available in Centerless model or with Permanent Center.

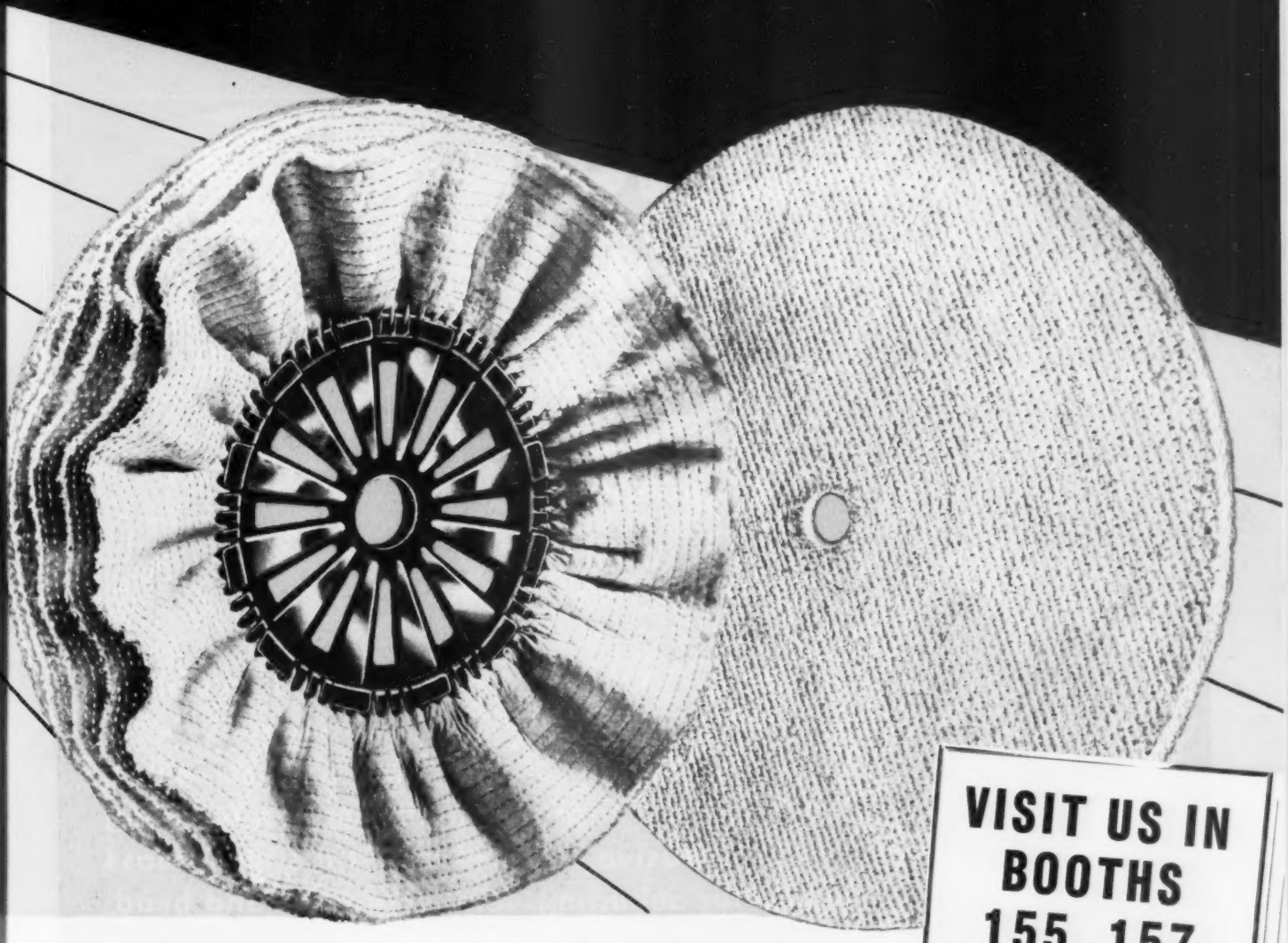
Automatic UNIT SISAL BUFF

Extra-flexible for fast cutting and finishing on contoured surfaces. Sisal "units", cloth wrapped to prolong wear, follow every crevice and variation in shape. Air-cooled *unit design* prevents burning or discoloration, even at high speeds. In Centerless or Permanent Center types.

Job that's TOUGH...

use an

AMERICAN BUFF !



VISIT US IN BOOTHS 155, 157
Industrial Finishing Exposition

Automatic
"OPEN" BIAS SISAL BUFF

Ruffled face eliminates troublesome streaking. New, exclusive "open" design combines the best features of both Bias Cloth and Bias Sisal buffs for fast cutting and high lustre finishing. Made of top-grade "Permanized" sisal, with or without cloth layers—in air-cooled Permanent Center construction.

Conventional
SISAL BUFFS

Top-quality "Permanized" sisal, in a variety of constructions: All-Sisal for even finish; Sisal with Cloth for long wear; Sisal with Krinkle-Kraft Paper for extra-sharp cutting; and Custom-Treated Sisal, for harsh or soft cutting to meet your specific needs.

AUTOMATIC BUFF COMPANY Division of

American Buff Company

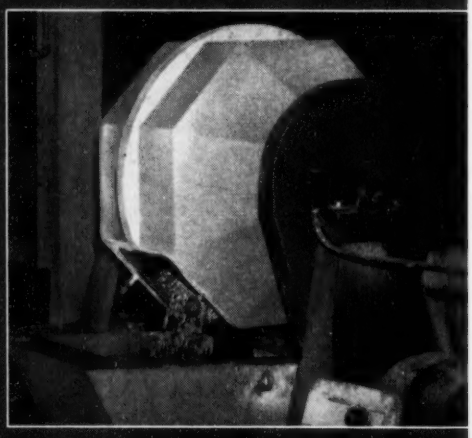
2414 South La Salle Street • Chicago 16, Illinois • Telephone: CAlumet 5-1607

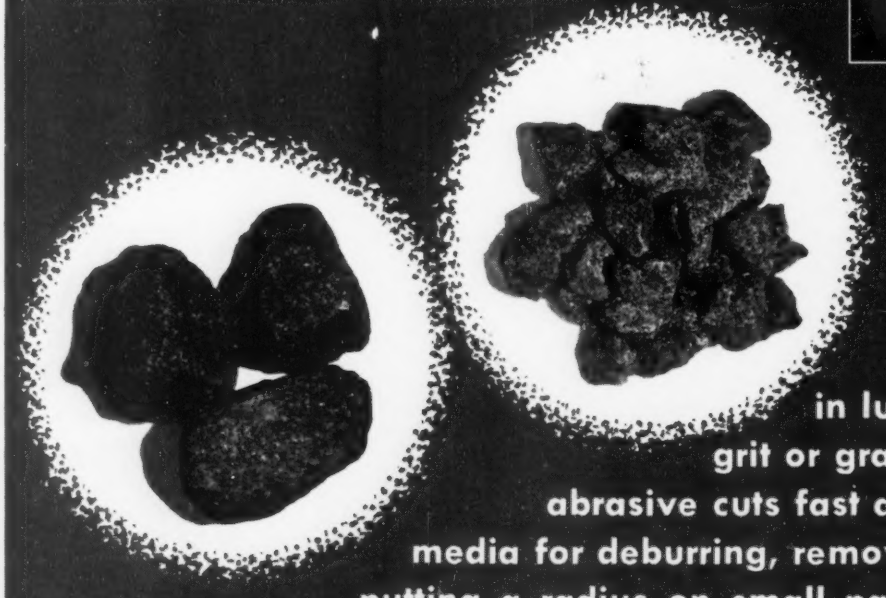
For less tumbling time ... lower finishing costs

Borolon®
TRADE MARK

TUMBLING ABRASIVE

HARD • SHARP • TOUGH • UNIFORM





Fused crystalline aluminum oxide . . . in lumps, nuggets, chips, grit or grain. Borolon tumbling abrasive cuts fast and is the ideal mass media for deburring, removing flash and bead, putting a radius on small parts . . . and giving a precision finish even to micro-inch specifications. Full range of sizes. Send for catalog bulletin ESA 236.

SIMONDS ABRASIVE CO.

PHILADELPHIA 37, PA.

BRANCH WAREHOUSES: BOSTON • DETROIT • CHICAGO • PORTLAND • SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y. Simonds Canada Saw Co. Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

McGEAN BRIGHT NICKEL

Dependable • Easier to Maintain • Versatile

features

Simple control:

Complete methods are available for "on the job" analyses of each bath constituent. Liquid addition agents are easily added to the bath.

Less bath maintenance:

Exceptional tolerance to metallic and organic impurities results in less frequent bath purification treatments.

Wider plating range:

Extreme flexibility allows successful operation over wide ranges of solution composition and plating conditions.

Easier chrome plating:

Active nickel deposits provide surfaces which readily accept chromium plating.

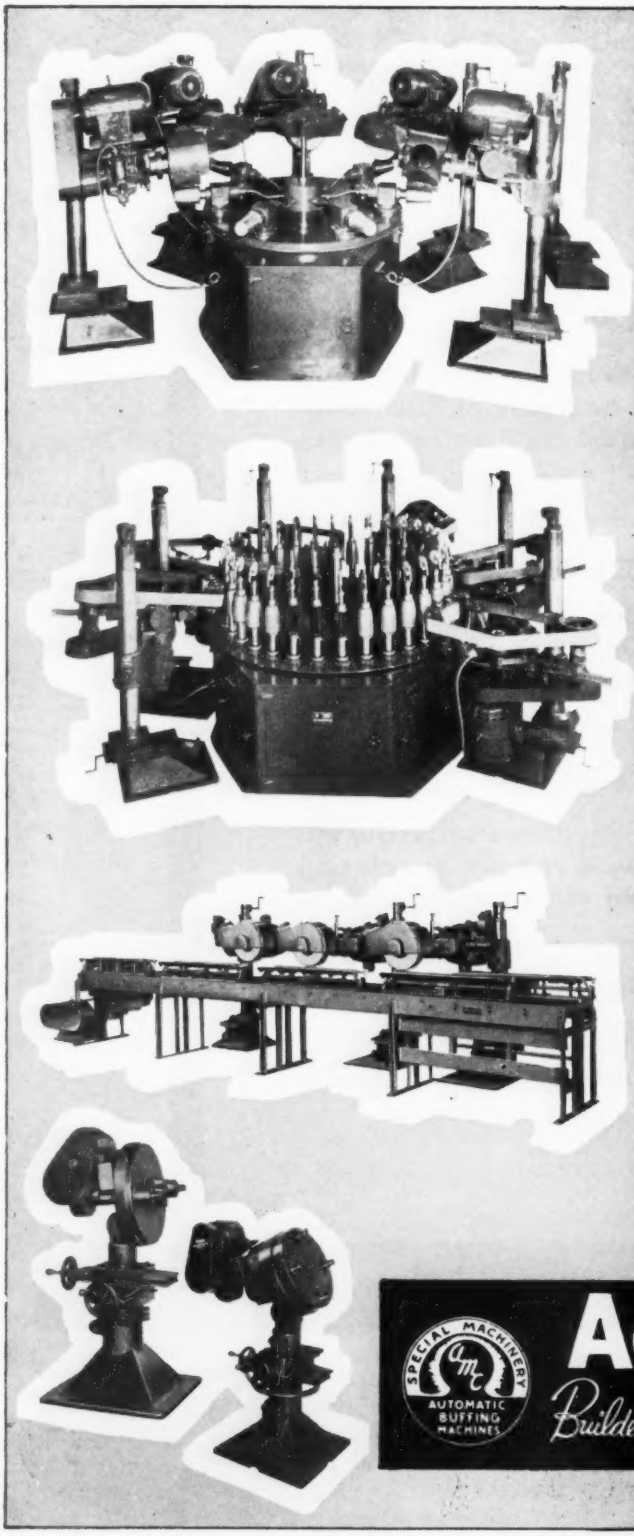
The McGean Chemical Company—1040 Midland Building—Cleveland 15, Ohio

dependable manufacturer of anodes and electroplating chemicals

McGEAN

ACME *Automatic*
POLISHING *and* BUFFING MACHINES

are engineered for low cost, high production finishing...



- For Polishing and Buffing, De-burring, Wire Brushing and Micro-finishing
- Rotary *Automatics*
  Straightline *Automatics*
  Semi-Automatics
- Backed by half a century of specialized experience and progressive development
- Proved performance and dependability in industry

RECOMMENDATIONS and QUOTATIONS

• We will be pleased to receive blue prints or preferably finished and unfinished samples of the part you contemplate finishing together with detailed information on present finishing operation and production requirements. On receipt of samples and data we will offer recommendations and quotations.

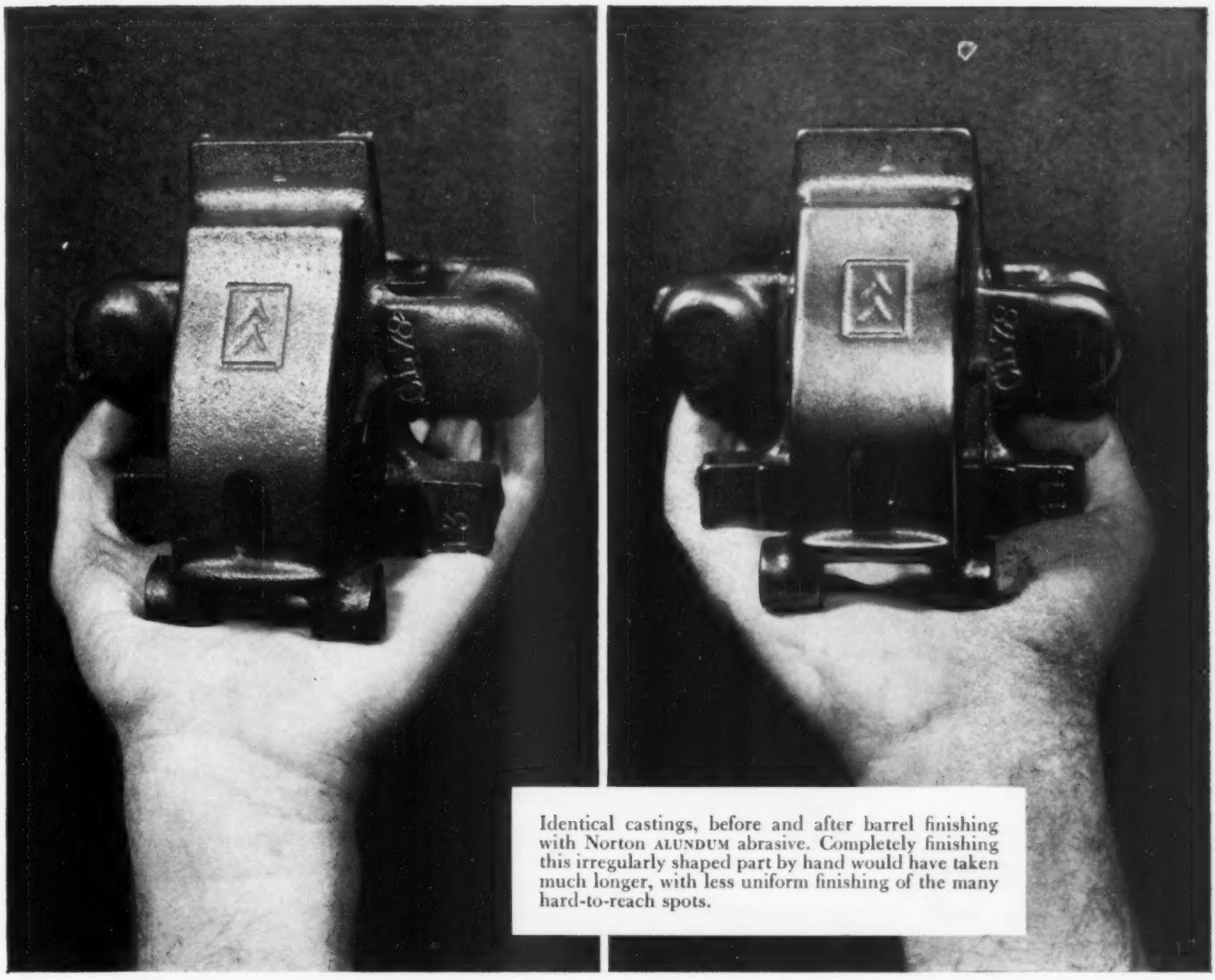
SPECIAL MACHINERY — AUTOMATIC BUFFING MACHINES

ACME *Manufacturing Co.*

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

CATALOGS ON REQUEST



Identical castings, before and after barrel finishing with Norton ALUNDUM abrasive. Completely finishing this irregularly shaped part by hand would have taken much longer, with less uniform finishing of the many hard-to-reach spots.

ALUNDUM* tumbling abrasive tames another tough one!

Intricate parts finished faster, more thoroughly, when Norton abrasive adds the "TOUCH of GOLD"

The trickier, more intricate the parts, the easier it is to see the many advantages of barrel finishing with ALUNDUM tumbling abrasive. Hand finishing the casting illustrated, for example, would have been a long, tiresome chore — and an uneven job at best, due to the many irregularities of shape.

For parts ranging from even heftier castings down to tiny needles, there's nothing like ALUNDUM abrasive to bring out *all* the benefits of barrel finishing. This typical Norton abrasive development is sharp, dense, hard and non-fracturing. Its blocky shape eliminates slivers and chips in the tumbling process. In your tumbling barrels it assures:

- *Highest uniformity of radii and surfaces, with brightest, smoothest finish.*
- *Continual savings of man-hours, by reducing tumbling cycles, scrap and reworking to minimum.*

See Your Norton Distributor

for further facts on how ALUNDUM abrasive can add the time-saving, profit-boosting "Touch of Gold" to your finishing operations. Ask him for the new 55-page booklet on barrel finishing. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G287

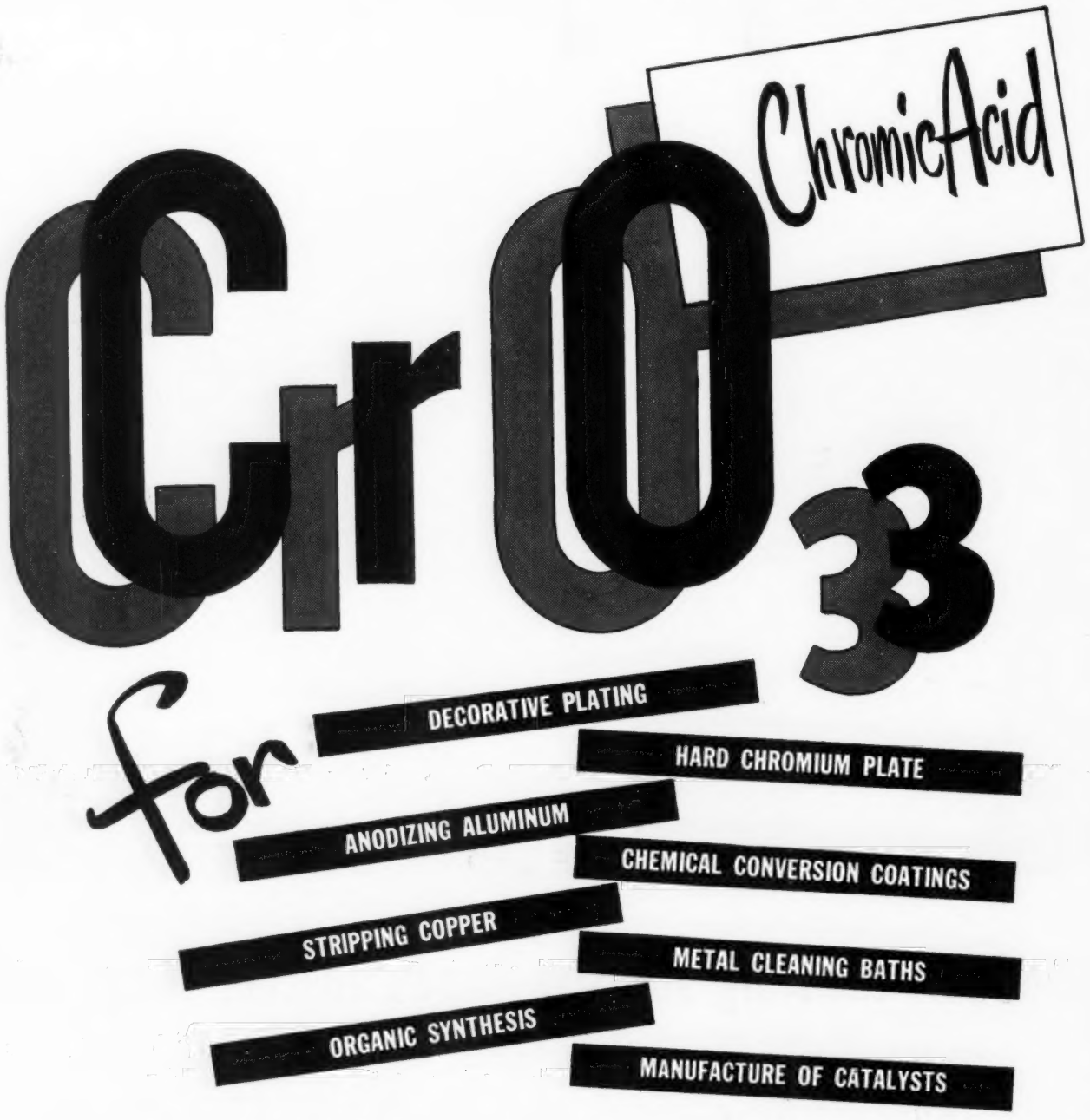
*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

Making better products... to make your products better

and its BEHR-MANNING division

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes



Chromic Acid production in commercial quantities followed the development in 1926 of a practical process for chromium plating. Originally employed almost entirely for that purpose, Chromic Acid's use has not only expanded in the metal industry but has also proved valuable in many chemical reactions unrelated to plating or metal surface cleaning.

Mutual is keeping abreast of these expanded applications and today supplies a technical grade of Chromic Acid, assaying at 99.75% or better, to an ever-widening list of customers.

Chromic Acid is but one of the chemicals of chromium made by Mutual, specialists in their production for over 100 years. Other Mutual products include Sodium Bichromate, Sodium Chromate, Potassium Bichromate, and Ammonium Bichromate.

MUTUAL CHEMICAL DIVISION

MUTUAL — ALLIED CHEMICAL & DYE CORPORATION

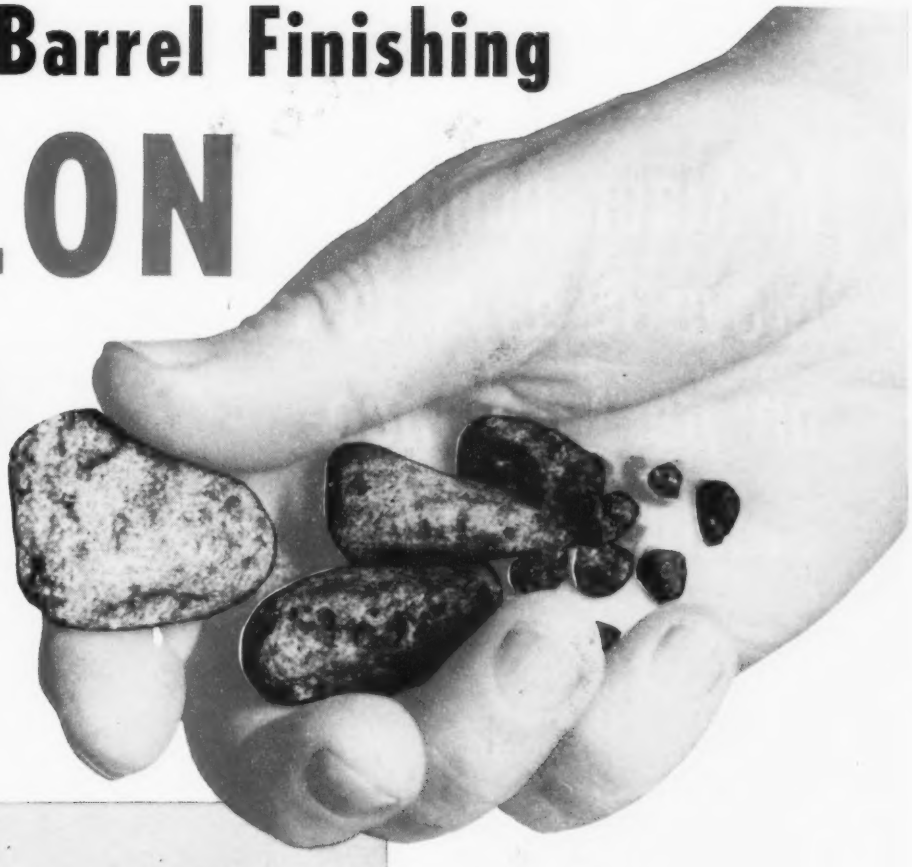
99 PARK AVENUE • NEW YORK 16, N. Y.

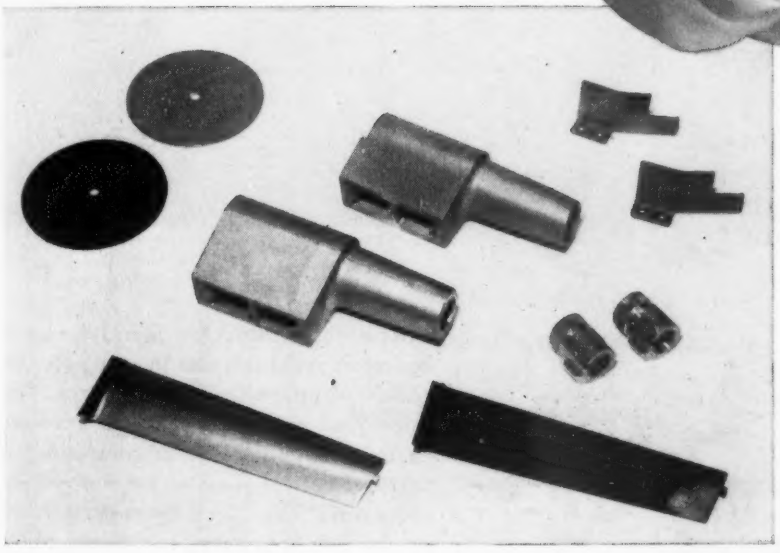
Allied Chemical

For Rapid Barrel Finishing

EXOLON

Tumbling Abrasive





Various stamped, die cast, forged and screw machine parts before and after barrel finishing with EXOLON abrasives.

• More and more manufacturers are turning to barrel finishing for its big savings and uniformity over individual hand finishing.

Naturally, the process is only as effective as the abrasive used. In response to the demand for a fast-cutting, long-life abrasive, EXOLON has developed this superhard aluminum oxide grain which is *barrel-finished itself* for non-scratch, precision smoothing of your metal surfaces.

May we barrel-finish some of your sample parts *at no obligation to you?* Or, if you prefer, we are prepared to furnish you trial lots of Exolon Barrel Finishing Abrasive at quantity discount for trial in your own barrel. You will find, as others are finding daily, that it gives you a superior finish at substantially lower cost. Write today!

SINGLE OPERATION ECONOMY

★ **IN CLEANING UP**
★ **IN REMOVING BURRS**
★ **IN REMOVING SCALE**

from:

- forgings
- metal castings
- metal stampings
- machined parts

which can be handled in the barrel.

WRITE TODAY FOR DETAILS including our new fact-filled catalog.

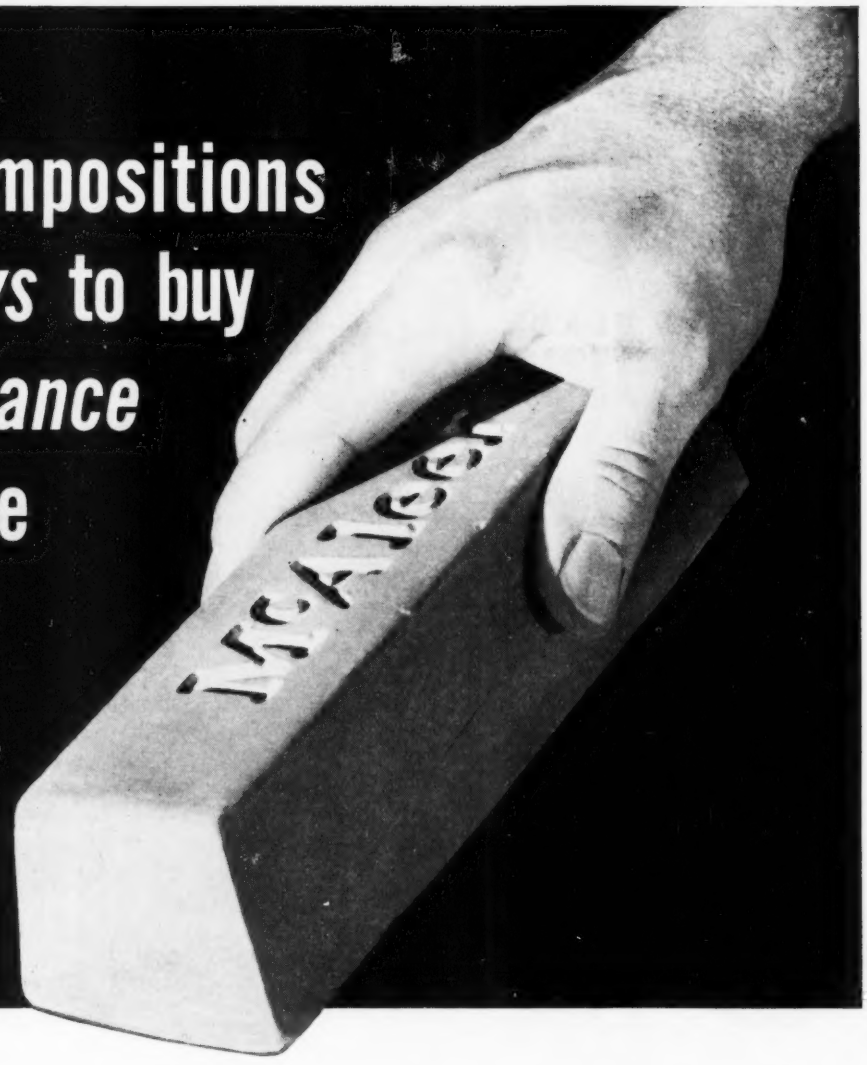
The EXOLON Company

945 East Niagara Street **Tonawanda, N. Y.**

Thorold, Ontario, Canada

***Manufacturers of* SILICON CARBIDE *and* ALUMINUM OXIDE ABRASIVES**

McAleer compositions prove it *pays* to buy on *performance* ...not price



THERE'S no denying it ... the price paid for buffing and polishing materials is a most important factor in determining over-all metal finishing costs. Yet, all too often, material that is lowest in price may prove most expensive in the long run.

The threat to the investment represented in time and material alone, to bring an important part to the point of polishing and/or buffing, makes it imperative that you use a composition that is exactly "right" for your work. Rejections mean money and irretrievable man-hours are lost — to say nothing of how unbalanced finishing output affects regular production schedules.

Rigid Laboratory Control insures *uniform* quality in *every* shipment of McAleer compositions

Cost-wise, production metal finishing operators avoid this risk by using McAleer *Quality-Controlled* compositions. They know from experience that the "job-fitted" characteristics of McAleer compounds invariably deliver *a value far beyond purchase price.* The value? Extra performance on the job, less waste, minimized rejects, increased work output and lower operating costs.

Whether you use extruded, bar-form or spray compositions it will pay you to make a proof-of-performance test of a McAleer composition that's specifically formulated to help you finish your job better, faster, at less cost.

The way to better buffing and polishing for you can start with a phone call, wire or letter to McAleer. You make the start—we'll take care of the *finish*. Let's do it NOW!

McAleer MANUFACTURING CORP.

101 S. WATERMAN AVE. ★ DETROIT 17, MICHIGAN

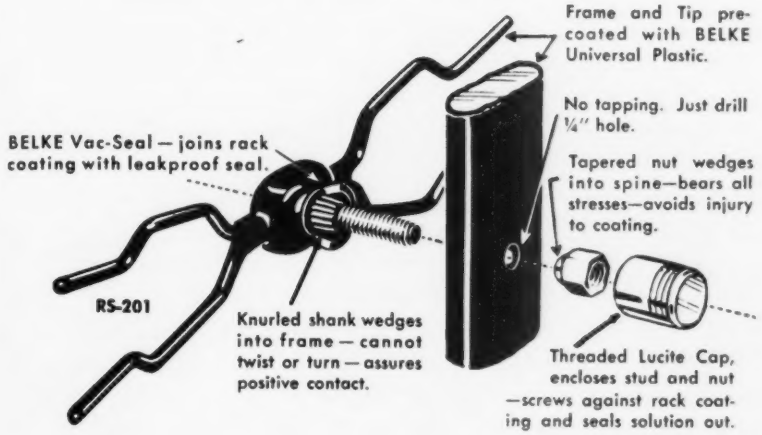
Since 1923, Manufacturers of *Quality-Controlled* Metal Finishing Materials

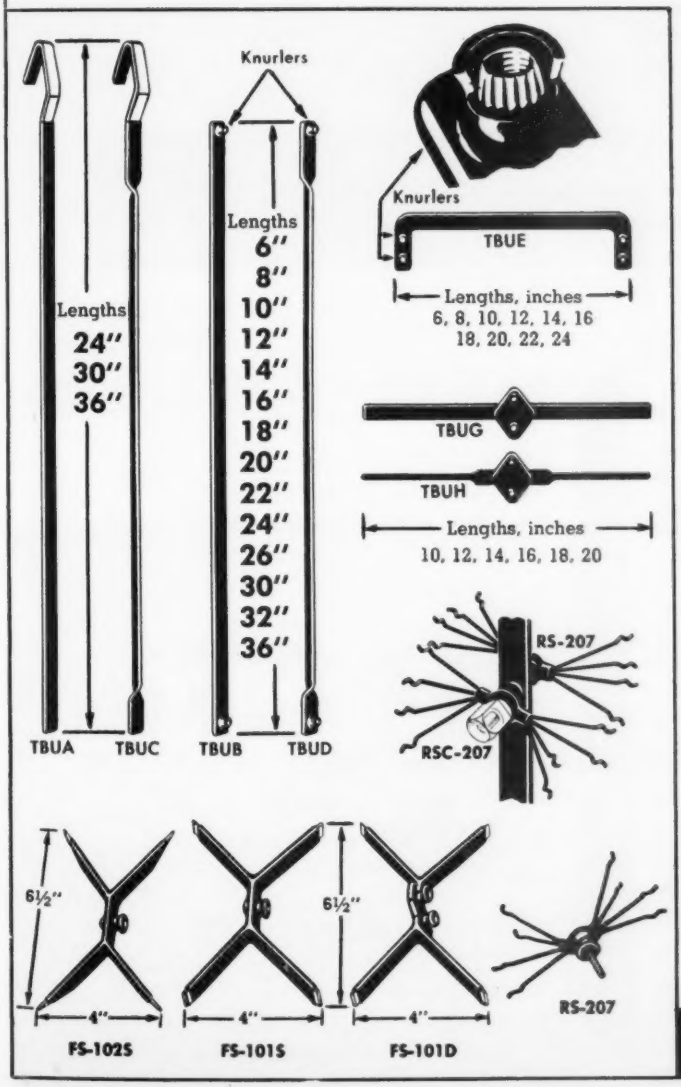
No Waiting--BIG Saving

With BELKE Thinker Boy Plating Rack Assemblies

Booths 355 and 356 Cleveland Show

You can be ready to plate in minutes


Frame and Tip pre-coated with BELKE Universal Plastic.
No tapping. Just drill ¼" hole.
BELKE Vac-Seal — joins rack coating with leakproof seal.
Tapered nut wedges into spine—bears all stresses—avoids injury to coating.
RS-201
Knurled shank wedges into frame — cannot twist or turn — assures positive contact.
Threaded Lucite Cap, encloses stud and nut —screws against rack coating and seals solution out.



An investment-- not an expense!

When Thinker Boy Racks are no longer needed *they do not become useless as do other racks–*

You can quickly change the tips, change spacing of the tips or convert Thinker Boy Racks to other designs–

With an accumulation of Thinker Boy Members and Tips, *you can have specially designed racks for the mere cost of assembly*–be ready to plate a new job efficiently in minutes or hours instead of days or weeks.

Amazing Adaptability

Thinker Boy affords amazing advantage in efficiently meeting widely varied racking needs.

You can assemble racks of just about any style or type. You can have the exact tip arrangement and spacing that suits the job. *You can adjust Thinker Boy Tips to hold an unbelievable variety of articles.*

New literature, just off the press, shows how. Illustrated Thinker Boy Rack Members and Thinker Boy Tips. Shows how to assemble many different types of racks and how to adjust standard Thinker Boy Tips.

Ask your BELKE Service Engineer or write.

Belke Manufacturing Co.
947 N. Cicero Ave., Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS

avoid stream pollution due to chromium waste...

...with W&T Sulphur Dioxide Reduction Equipment

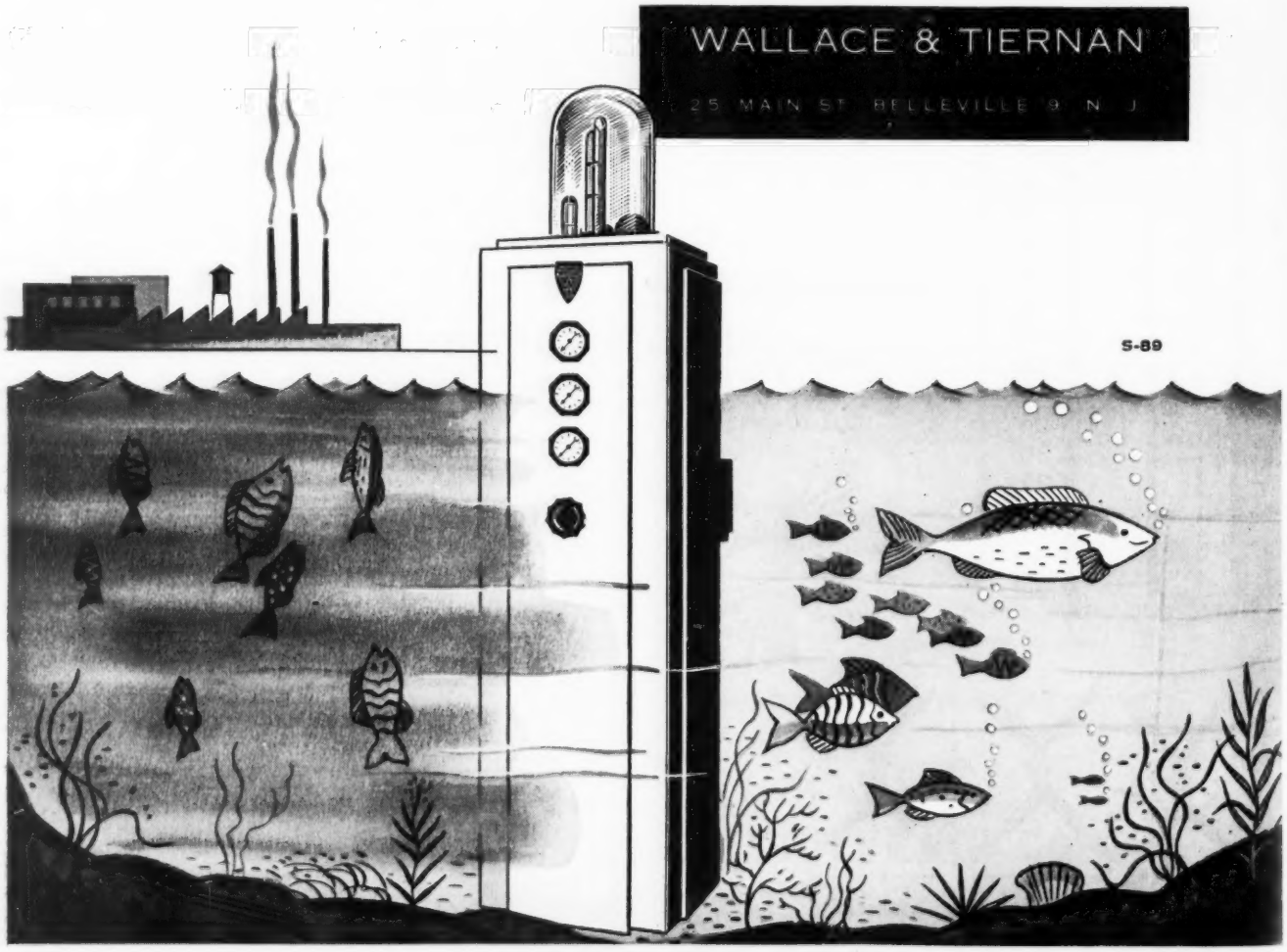
With the proper treatment equipment, toxic hexavalent chromium can be reduced by sulphur dioxide to the trivalent form and then completely precipitated by alkali for standard removal to a disposal area — such as a lagoon. After this treatment the waste water can be drawn off and safely disposed of in the usual manner. This treatment is in full compliance with most local and state pollution abatement laws.

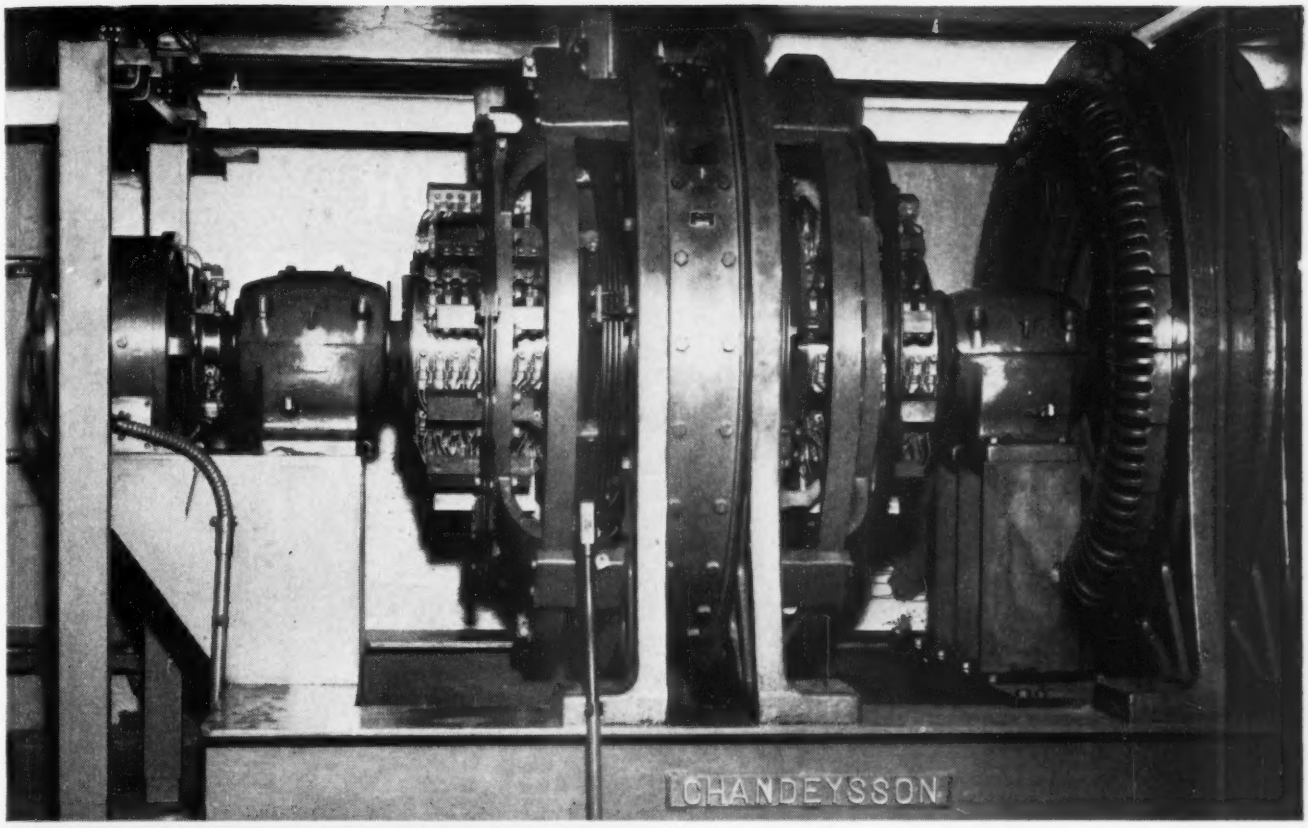
Wallace & Tiernan offers the heat treating and metal finishing industries several types of Sulphur Dioxide Feeders with optional controls for manual, semi-automatic or fully automatic operation. These feeders are adaptable to either the "batch" or "flow-thru" methods of treatment in both large and small plants.

Similar equipment is also available for the destruction of cyanide waste by alkaline chlorination.

W&T offers PROVEN EQUIPMENT — hundreds of similar units are serving industry today, EXPERIENCE — over forty years of building chemical feeding equipment, and SERVICE — field representatives are located in principal cities throughout the country.

Write today for additional information on W&T Sulphur Dioxide Feeders and Alkaline Chlorination Equipment, at no obligation to you, of course.





INDUSTRY LEADERS CHOOSE

Chandeysson

ELECTROLYTIC GENERATORS

Example:

Efficient, Economical Power Conversion at McDonnell Aircraft Corp.

One of the slow-speed, heavy-duty Chandeysson Generators installed at McDonnell Aircraft Corporation's plant in St. Louis.

Long life and continuous efficient operation of Chandeysson Generators is assured by a combination of the finest, most durable materials . . . proven design . . . and conservative engineering with plenty of overload capacity.

Use Chandeysson GENERATORS

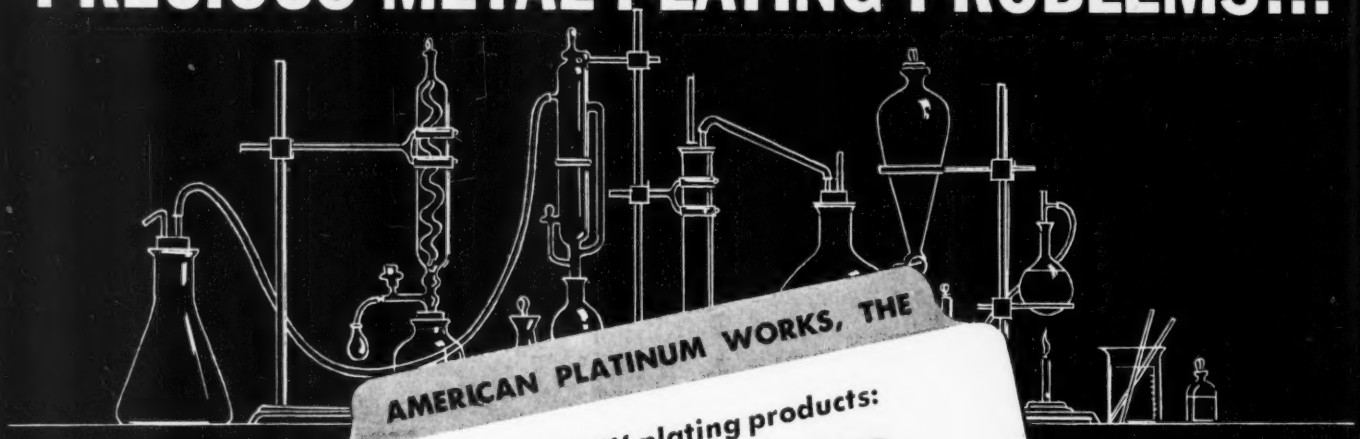
For Low-Voltage Power Supply AND SAVE 4 WAYS

1. **Use Less Power** . . . precision-built for high efficiency and built-in voltage regulation.
2. **Be Sure Of Power When You Need It Most** . . . overload capacity as great as 50% momentarily and 25% sustained, without distress or damage.
3. **Get More Out Of The Power You Pay For** . . . built-in high power factor at no extra cost.
4. **Enjoy Lifetime Power Dividends** . . . sustained, lifetime overall constant efficiency as high as 85% does not decrease with age or overload.

For product information write for bulletins D-101 and D-102—for names of users and installation data ask for bulletin D-104.

CHANDEYSSON ELECTRIC COMPANY • **4074 Bingham Ave., St. Louis 16, Missouri**

TO HELP SOLVE YOUR PRECIOUS METAL PLATING PROBLEMS...



AMERICAN PLATINUM WORKS, THE

A partial list of APW plating products:

A. A. SILVER ANODES
POTASSIUM SILVER CYANIDE
SILVER CYANIDE
C. P. SILVER NITRATE

Meets A.C.S. Specifications

Our Research Staff develop the anodes and the precious metal salts plating materials you need for best results. The valuable experience and facilities of our Electro-chemical Research Division are at your service, to help minimize your costs or improve efficiency in your plating procedures.

We think of both as equally important services and APW welcomes requests for either one or for both. No charge for the technical service—we just want to be sure you use it—*freely*.

WRITE FOR INFORMATION AND CURRENT QUOTATIONS.

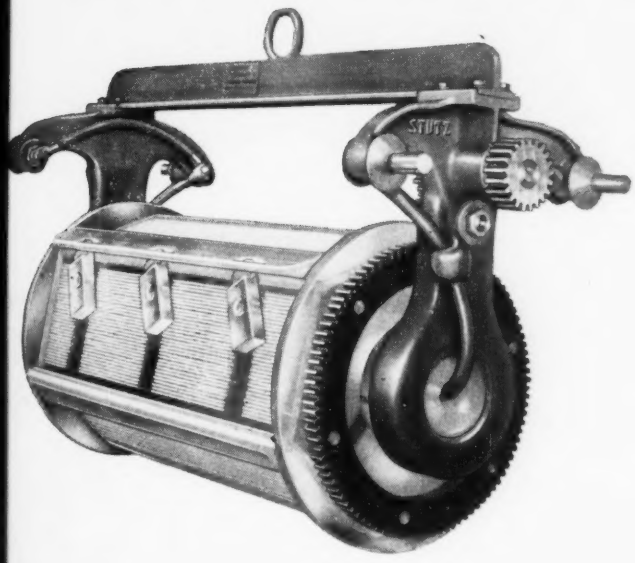
THE AMERICAN PLATINUM WORKS

231 NEW JERSEY RAILROAD AVENUE · NEWARK 5, NEW JERSEY

STUTZ PLATING BARRELS of High Tensile PLEXIGLAS

for:

- **Heavy Duty Production**
- **Highest Possible Current**
- **Complete Cycle—all solutions (temperatures to 180°)**



Stutz Plating Barrel Unit for continuous operation through Alkali Cleaning, Acid Pickling, Acid and Alkaline Plating solutions and rinsing. Largest number of cylinder perforations possible.

Stutz Plating Barrel Unit, Motor Drive Mounted Overhead. Continuous rotation of cylinder from one operation to another and where a minimum of solution dragout is important. Roller bearing chain drive to absorb load shock. On a complete Barrel Plating installation, this type of equipment can be made at lower cost since motor drives are not required on each tank station. Sizes 12"x24" to 18"x42" I.D.

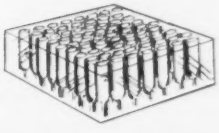
DELUXE PORTABLE PLATING BARREL

Made in 2 standard sizes.

Also smaller and with partitions.

Standard openings	3/32"
6" x 12" I.D.	$176.50
8" x 18" I.D.	$275.00
Stand (for either size)	$ 37.50
Basket (for either size)	$ 8.65

On inquiry specify whether production or portable barrels are desired.



PATENTED DUAL HOLE

Where extremely small openings are required, our patented Dual Hole is used. This design permits solution flow with a minimum of resistance.

5" CYLINDER BEARINGS

Cylinder bearings 5" diameter for heavy duty service and maximum life. Trunions are retained with sealed-in stainless steel bolts. Replacement made quickly if necessary.

WRITE TODAY FOR OUR NEW COMPLETE 1955 CATALOG. JUST OFF THE PRESS.

GEORGE A. STUTZ MFG. CO.

4430 CARROLL AVENUE • CHICAGO 24, ILLINOIS

"Complete metal finishing equipment and supplies"

Serving Industry for 35 Years

DOW

You Can See Why

SARAN LINED PIPE

is your answer to downtime losses

It's made of corrosion-resistant saran pipe swaged right inside rigid steel pipe . . . two pipes in one for longest-lasting performance.

Here's really trouble-free piping . . . saran lined pipe, fittings and valves! This modern piping has a durable inner lining that eliminates shutdowns due to corrosion . . . forms tight-fitting joints that prevent leakage. Saran lined pipe, fittings and valves won't burst under working pressures up to 150 psi . . . and saran lined cast steel fittings are available for even higher pressures. Every single piece of saran lined pipe, fittings and valves is carefully spark-tested by hand to be sure there are no pinpoint holidays or cracks in the lining.

Installation costs are low with saran lined pipe, fittings and valves, too. They can be cut and threaded in the field with modified pipe-fitter's tools. And because they're rigid, few supporting members are needed.

If your operation requires the conveying of acids, alkalies, solvents and other corrosive liquids, be sure to investigate saran lined pipe, fittings and valves today. For further information, write the Saran Lined Pipe Company, 2415 Burdette Avenue, Ferndale 20, Michigan, Dept. SP529C.

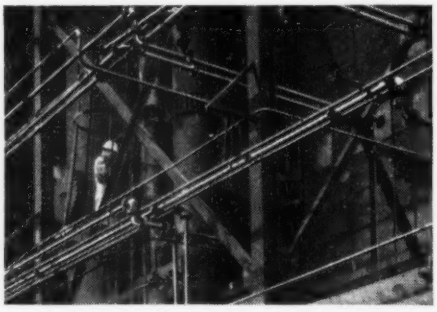
RELATED SARAN PRODUCTS—Saran rubber tank lining • Saran rubber molding stock • Saran tubing and fittings • Saran pipe and fittings.

SOME OF THE MANY INSTALLATIONS USING

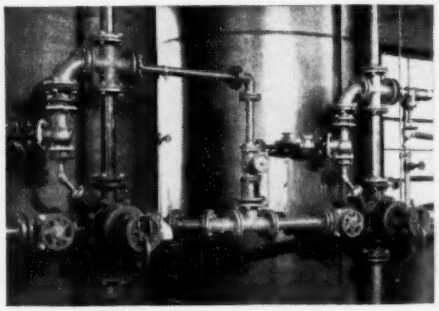
SARAN LINED

STEEL PIPE

Saran Lined Pipe is Manufactured by The Dow Chemical Company Midland, Michigan



Hydrochloric acid has been conveyed in this installation for well over seven years. Service has been eminently satisfactory.



Saran lined pipe is used here in an automatic water de-ionizer. This installation has also had a long record of uninterrupted service.

See the Dow Booth, No. 440 at the Industrial Finishing Exposition, Public Auditorium, Cleveland, Ohio, June 20-23.

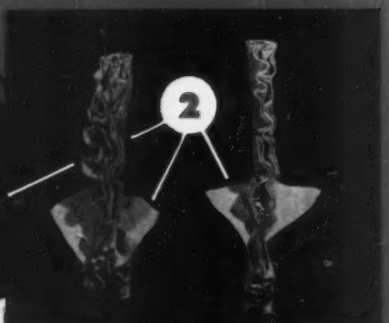
you can depend on DOW PLASTICS DOW

No other Buff...

has all these advantages

CODMAN NON-FRAY BUFFS

1. THICKNESS OF RING VARIES DENSITY
2. TRAILING ENDS — (Safely)
3. NON-COMPRESSIBLE CONSTRUCTION
4. NON-METALLIC CENTER — (No Shaft Scoring)



OPEN FACE CLOSED FACE

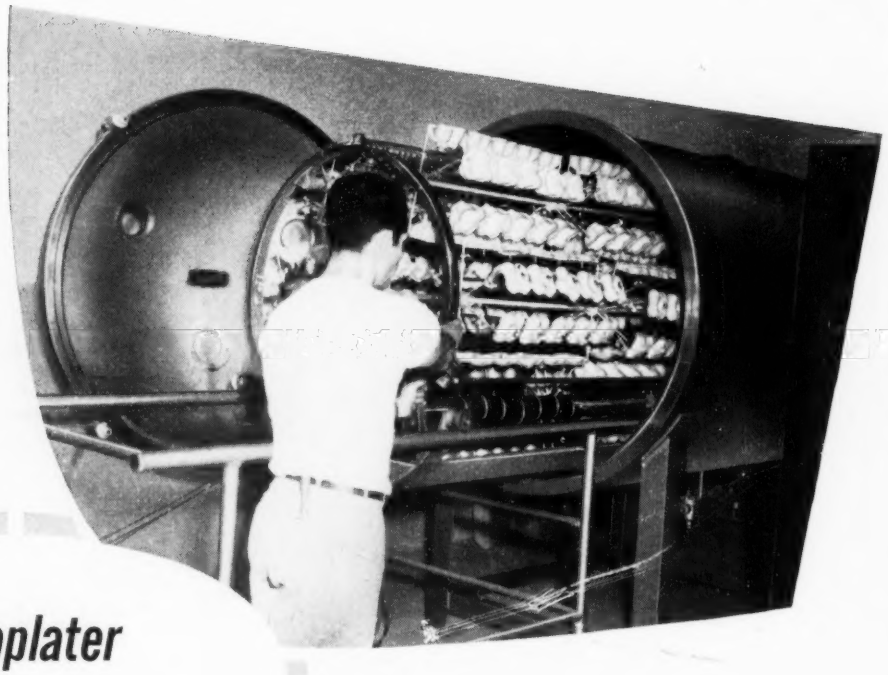
Available-Closed or Open Face Ventilated, Of Course, When Necessary

F. L. & J. C. CODMAN COMPANY

ROCKLAND, MASSACHUSETTS

the greatest name in buffs for over 55 years

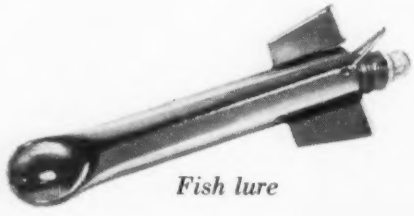
BRANCH OFFICES — PHILADELPHIA, DETROIT, LOS ANGELES, INDIANAPOLIS, GRAND RAPIDS



A rack with baby bottle warmers is loaded into a Stokes vacuum plating unit at Specialized Plating Company. Vacuum plated pieces have a bright, durable finish as shown in the completed metal products above and below. Vacuum plating can also be applied to glass, plastics, textiles, and paper, giving the custom finisher broad opportunities.

Custom Electroplater Cuts Costs 50% through Vacuum Plating

Lamp base



Fish lure

Light swivel

Specialized Plating Company of Los Angeles, California, estimates that vacuum plating saves them 50 to 60% over electroplating on typical parts such as those shown. This custom finishing firm uses a 48-inch Stokes vacuum plating unit to apply functional and decorative coatings to a broad range of metal parts.

Vacuum plating provides a low-cost, durable, non-tarnishing finish on metals. Endurance—by salt-spray tests—is up to ten times that of electroplated finishes. The process deposits a lustrous aluminum coating on all types of die castings, steel stampings, aluminum spinnings and slush metal. Polishing and buffing operations are eliminated.

Stokes makes vacuum plating units in 24, 36, 48 and 72-inch sizes and has a fully equipped laboratory where your samples can be plated. Through the Stokes Advisory Service, complete engineering advice on production and plant lay-out is at your disposal. Write for your copy of an authoritative illustrated brochure on this low-cost finishing method.

F. J. Stokes Machine Company
Philadelphia 20, Pa.

STOKES

OFFICES IN PRINCIPAL CITIES
REPRESENTATIVES THROUGHOUT THE WORLD

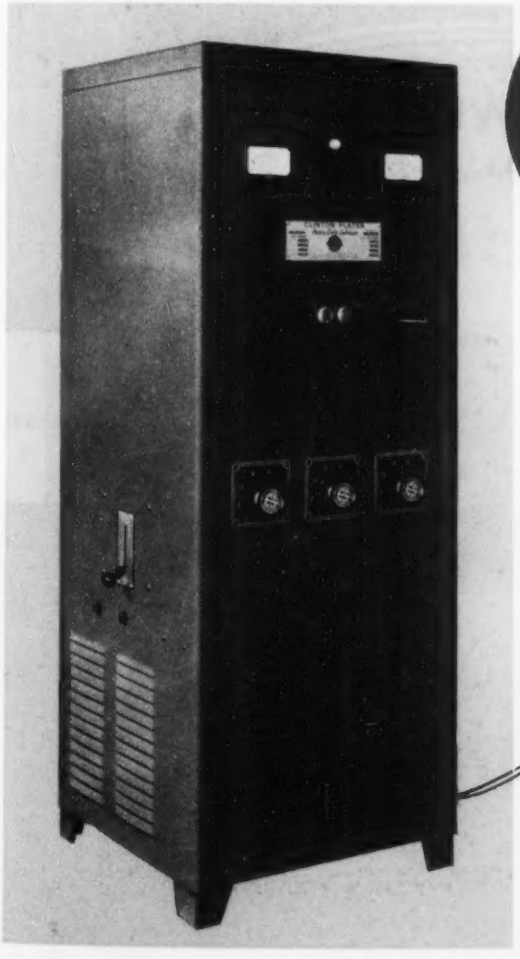
MEET THE

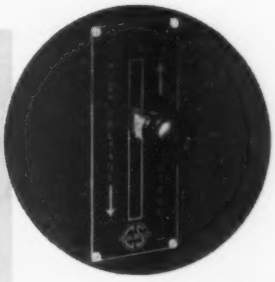
Clinton POWER TWINS

with the exclusive

Hi/Lo DUAL-O-MATIC

VOLTAGE SELECTOR SWITCH





The "Dual-O-Matic" Transformer Circuit manually operated from the Hi/Lo voltage selector switch is revolutionary in design and function as it permits the maximum DC amperes to be drawn on any voltage setting from 2-12 volts without reconnecting the DC output terminals in parallel or series. The Hi/Lo Dual-O-Matic voltage selector circuit is exclusive with Clinton.

● The Clinton Selenium Rectifier Power Twins are available in two series—Model 1512H02 rated at 1500 Amperes/12 volts and Model 2012H02 rated at 2000 amperes/12 volts. Each of these units can be operated at 2-6 volts or 6-12 volts by means of the voltage selector switch shown, with full amperage available throughout the entire voltage range. Both series of the Clinton Power Twins come complete with built-in voltage regulators and all necessary operating accessories . . . Engineered for safe, cool operation; protected against overload and corrosion; the Clinton Power Twins are built for years of trouble-free operation . . . These Heavy Duty Production Models are priced amazingly low.

MODEL 1512H02 (1500 AMPERE) $1295

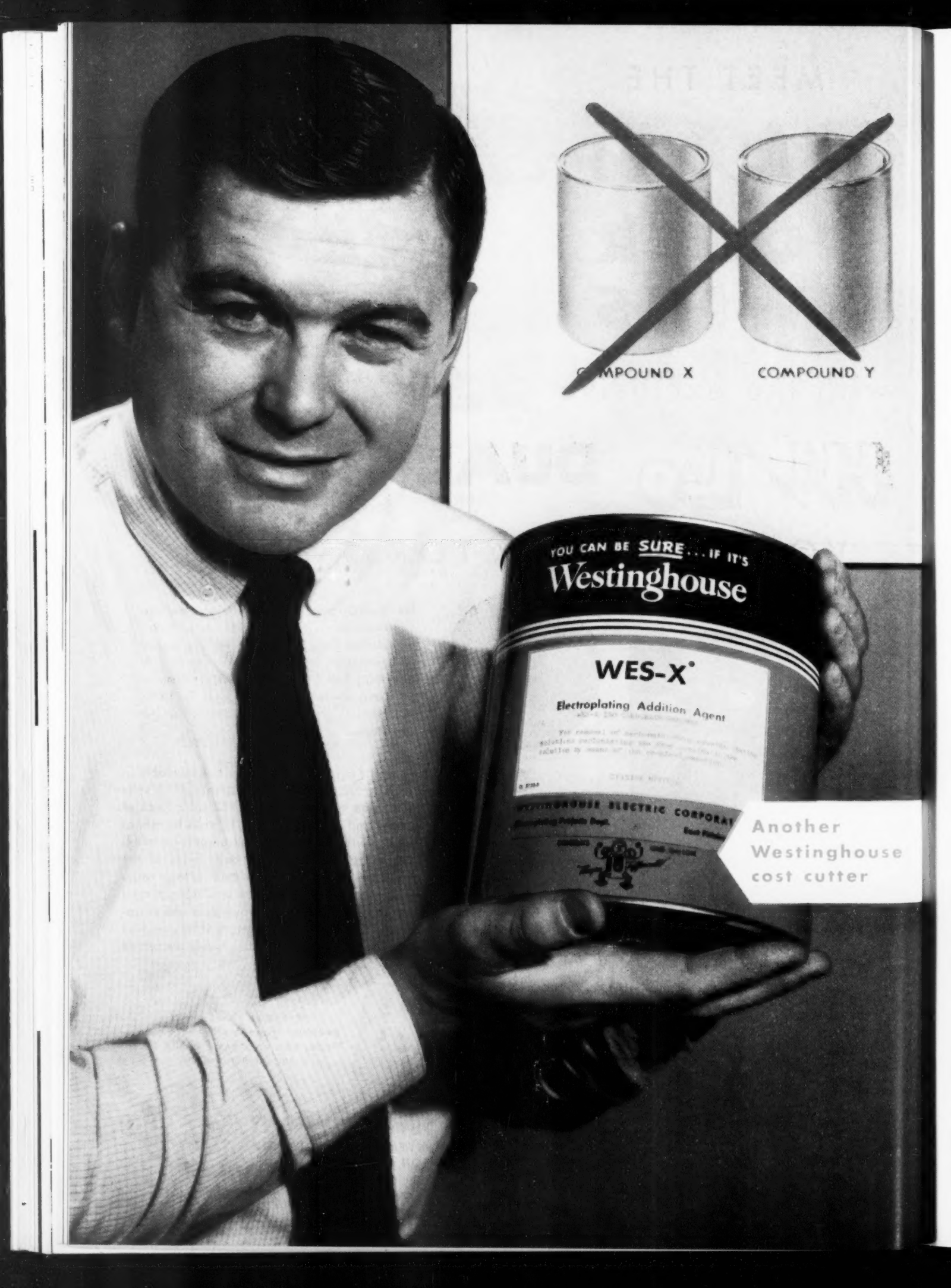
MODEL 2012H02 (2000 AMPERE) $1595

PRICES F.O.B. CHICAGO

Ask us about our generous trade-in allowance plan. Write, wire or phone Franklin 3753 for further details.

CLINTON SUPPLY COMPANY
RECTIFIER MANUFACTURING DIVISION
110-112 S. CLINTON ST., CHICAGO 6, ILL.

CLINTON PLATER SINCE 1910


MPOUND X
COMPOUND Y
YOU CAN BE SURE... IF IT'S
Westinghouse
WES-X®
Electroplating Addition Agent
Another
Westinghouse
cost cutter

Now! Control both carbonate and cyanide with one compound . . . WES-X 150

New and exclusive 2-in-1 carbonate remover also replenishes cyanide; is the easy, low-cost way to keep any metal cyanide plating bath at right concentration for high-speed plating.

Westinghouse has developed a new and far better way to control cyanide plating. It is WES-X® 150—an efficient and economical compound which removes carbonates, helps eliminate certain contaminants; and maintains or increases uncomplexed or free cyanide at the same time.

Here are the big advantages of WES-X 150:

- High reaction efficiency—1.1 oz of WES-X 150 removes 1 oz of carbonates.
- Economical—1 oz of WES-X 150 yields 1.0 oz free cyanide.
- Precipitated particle size greater than with other methods—less work to handle and filter precipitate.
- Will not upset hydroxide control.
- Supplied in convenient metal drums.

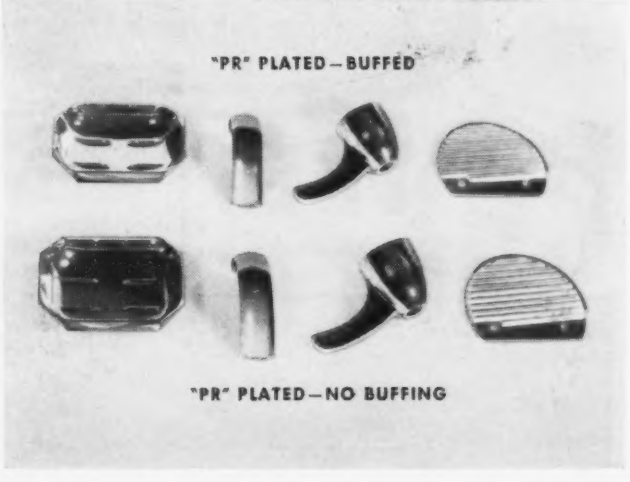
It is not necessary to batch treat the whole solution when WES-X 150 is used. And once WES-X 150 gets carbonate concentration within required limits for high-speed plating, it is an easy and low-cost means to control this concentration with WES-X 150 . . . the simplest and cheapest way to get the most out of your plating time!

Let a Westinghouse sales engineer help you put this new compound to work in your operation. All it takes is a free survey of your plating process and a specific recommendation on its application. Call your nearest Westinghouse sales office or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-10442

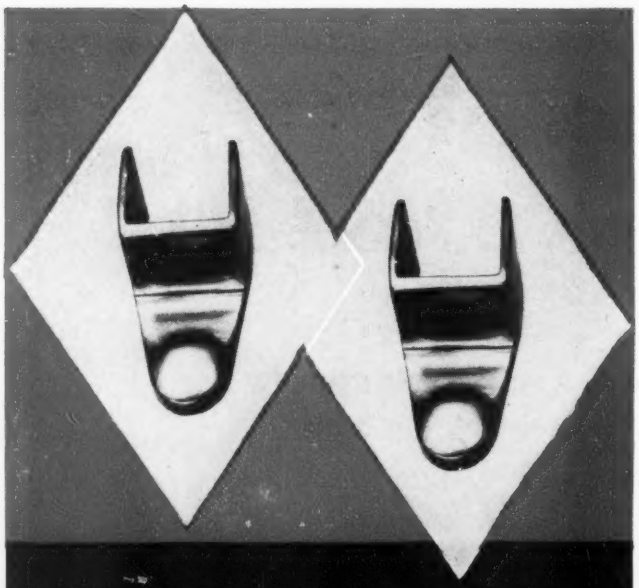
YOU CAN BE SURE . . . IF IT'S

Westinghouse

Westinghouse offers metal finishers a unique combination of advanced WES-X Compounds and application service. This Pilot Plant electroplating lab gives new processes a head start —makes them commercially sound. WES-X 150 was proved here. WES-X 100C, 102, 303A and 304 are other compounds.



This is an example of "PR"—Periodic Reverse—Plating. Bottom row shows superior leveling characteristics of "PR" . . . appearance is equal to buffed castings—with *no* prefinishing. "PR" Plating is one of the many *new* ideas and compounds to come from Westinghouse development.



Which one cost $4,792.00 *less to finish?*

Look alike? Yes! — but what a difference in finishing costs. It cost a plumbing fixture manufacturer only $.0104 to finish the part on the right by Supersheen Speed Finishing. The part on the left cost $.25 to finish by former costly hand finishing methods. That's a saving of over 95% or $4,792.00 for 20,000 units. Supersheened finished parts maintained a much greater uniformity too.

WHAT IS YOUR FINISHING PROBLEM? Let us show you how Supersheen can save you a great deal of money. WRITE TODAY.

ALMCO
Supersheen
SPEED FINISHING
ALBERT LEA, MINN.

FREE Mail coupon for this big, new 52-page catalog of money-saving finishing facts, figures, "before and after" photos. Learn the latest on equipment, compounds.

Almco Supersheen, 912F Marshall Street
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Please rush me your new catalog "Supersheen Speed Finishing."

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ILLCO-WAY
ionXchange

SOLVES A PROBLEM OF WASTE DISPOSAL...

The process of ionXchange offers the newest, simplest, and cheapest method of disposing of contaminated and weakened plating solutions. Instead of draining off such "waste" solutions, or treating them chemically where draining is impossible, ionXchange provides (a) recovery of most of the remaining plating acids for use in new make-up, (b) de-ionization of the contaminants so the effluent is clean and non-polluting, and (c) substantial savings in plating costs. *Practical* equipment is now available for treating chrome plating, anodizing, and other solutions.

TREATS RINSE WATER FOR RECOVERY AND RE-USE...

IonXchange also offers a method for treating rinse waters that accomplishes valuable improvements. Instead of running rinse water to drain in large quantities, ionXchange will (a) purify it completely so it can be recycled, (b) recover drag-out plating acids and make them available for new make-up of plating solution, and (c) reduce plating costs to a noticeable degree. Reprints of articles describing these operations, and pictures of successful installations, will be forwarded on request. Our representatives are available to consult on your specific needs.

ILLINOIS WATER TREATMENT CO.
836 CEDAR ST., ROCKFORD, ILLINOIS

ILLCO-WAY ionXchange

NEW YORK OFFICE: 141 E. 49TH ST., NEW YORK 17, N.Y.
CANADIAN DIST. PUMPS & SOFTENERS, LTD. LONDON, ONT.

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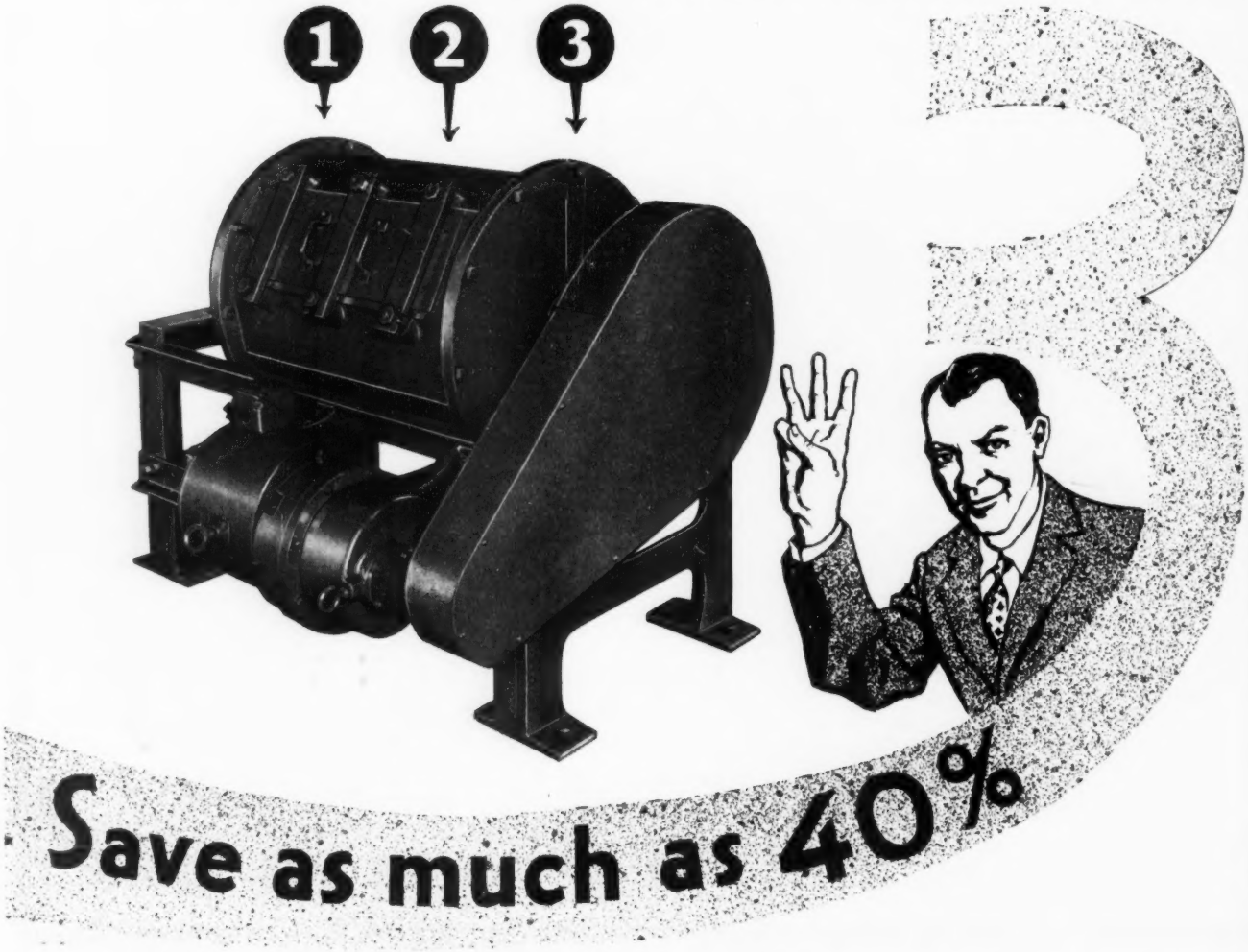
Sure—take a second look. The only *illusion* you see is the circles surrounding these samples of Dow's uniform caustic flake. Standard, ground or fines—each form is *uniform in size and quality.*

Dealing with Dow reduces all your caustic problems to pretty small size. You get the benefits of Dow's *multiplant production facilities* . . . of Dow's flexible, far-flung *distribution network* . . . of Dow's experienced, helpful *technical service* people, who can often point out surprising *savings.*

Hundreds of industrial caustic users, large and small, depend on Dow to fill their needs. Why not try this simple formula for complete caustic soda satisfaction? There's no illusion . . . or disillusion . . . when you "Get it from Dow". THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS DOW

ONLY HENDERSON OFFERS THIS 3-PIECE CONSTRUCTION

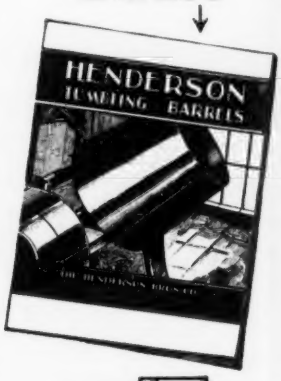


Save as much as 40%

In all Henderson Horizontal Cast Tumbling Barrels, one of which is shown above, the ends are separate from the body. As the body carries the load, it wears out long before the ends do. For a long time, therefore, with Henderson barrels, you will need to replace only the bodies, merely bolting on the original ends. Compared with the cost of complete new barrels, you can thus save as much as 40%!

After long experience in the finishing field, we like to recommend cast-iron barrels for most deburring and grinding jobs, but we make rubber, Neoprene, and wood-lined barrels — over 25 types, a barrel for every conceivable finish. Besides the highest quality of material and workmanship, when you buy a Henderson, you get a lot of "know how"!

***If You're A "Tumbler" Send for This* NEW CATALOG**



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"The Tumbling Barrel People"

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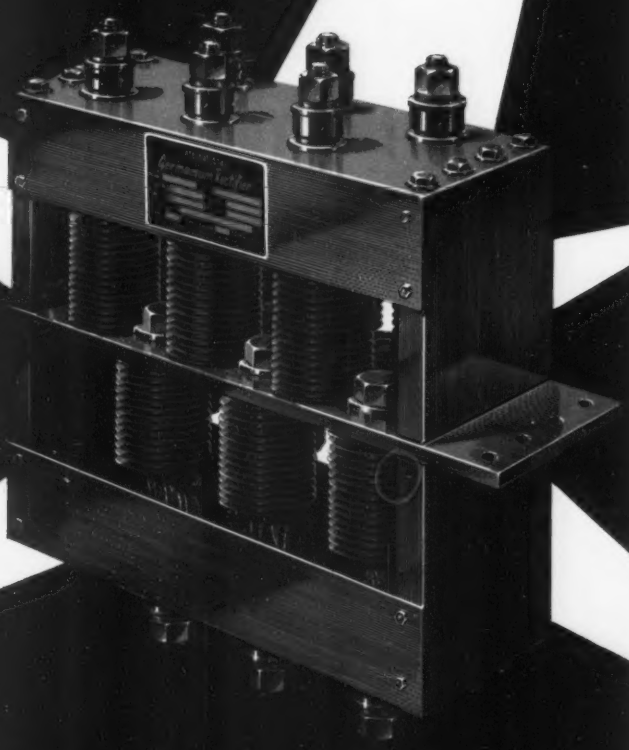

This new line of
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- High efficiency . . . up to 97%
- Lowest forward drop
- High reverse to forward ratio
- No reforming required after storage
- Unlimited life expectancy
- Ratings:
  26 to 66 AC input volts per junction
  150 to 100,000 amps DC output

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−55 C to + 75 C

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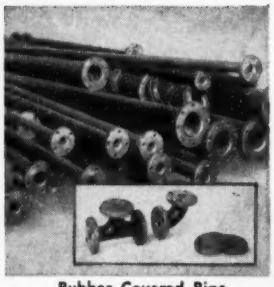
● To electroplaters and plating department heads in every section of the nation, the name ARco is symbolic of broad engineering knowledge . . . advanced methods and equipment . . . bringing top plating results.

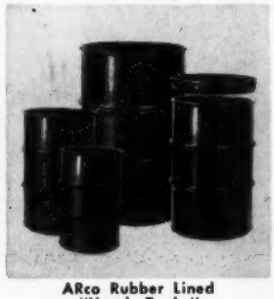
Corrosion-resistant ARco rubber coverings are applied to tanks and accessories, Diaphragm Systems, Parts Separators, Air Agitation Systems, Grids and Screens, Ventilation Equipment, Pipes and Fittings, Materials Handling Equipment. For expert advice on economical, efficient rubber applications to electroplating equipment, call on ARco engineers. Their help is offered to you without obligation. •

Sheet Rubber Lined Plating Tank—Open Type



Rubber Covered Pipe and Fittings

Rubber Lined Diaphragm Plating Tank



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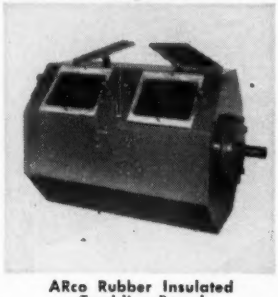

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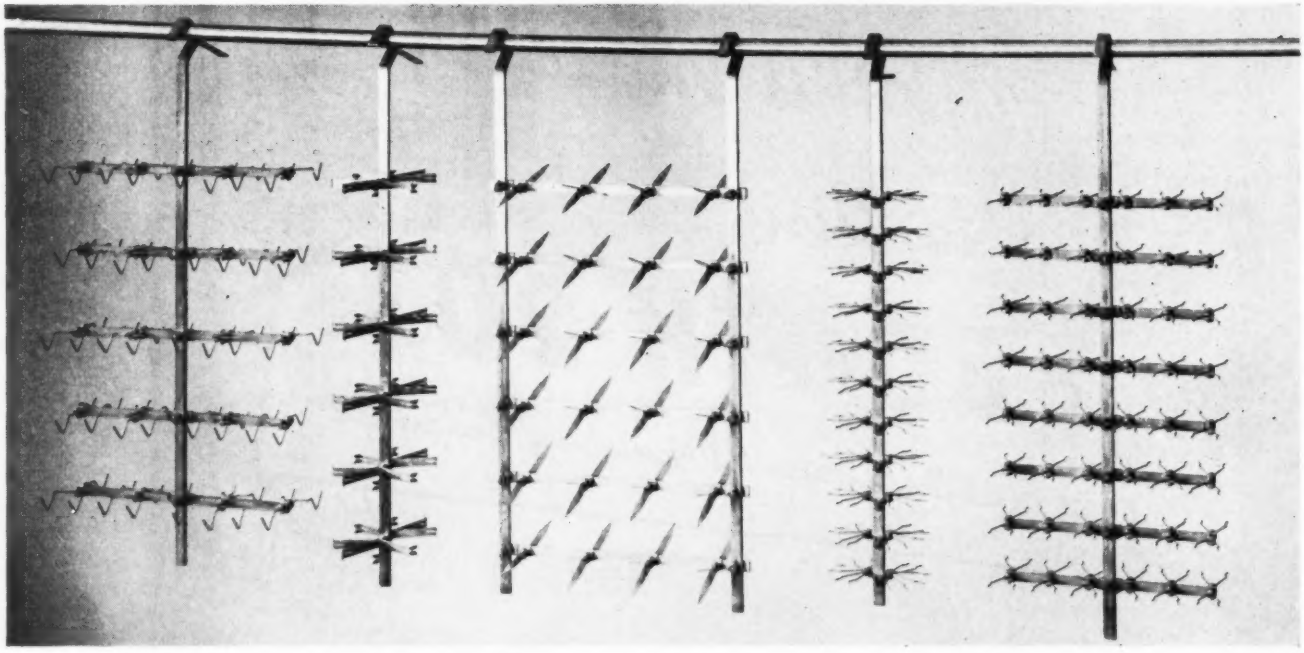


with Standard's ERECT-A-RACK

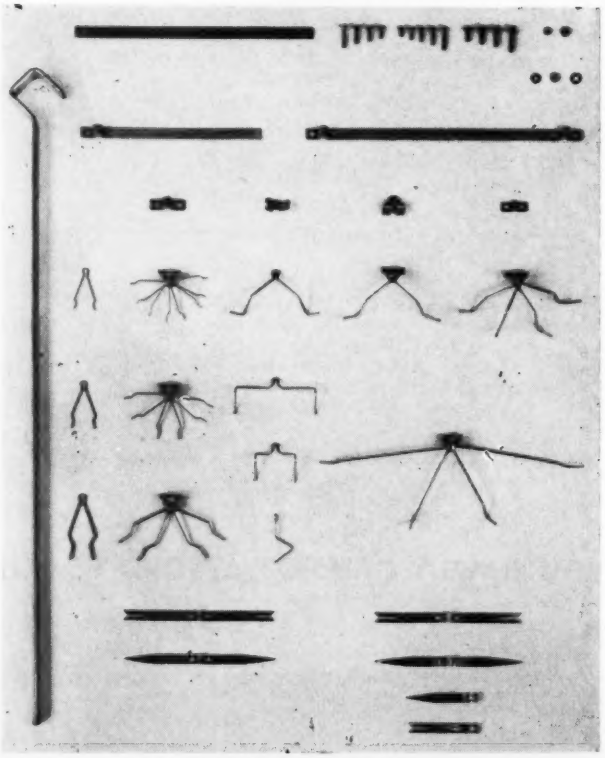
Now you can make up your racks exactly as you need them, when you need them, at the lowest possible cost. You can cut rack preparation time to a fraction for those emergency jobs — using preformed parts.

No bulky equipment needed for bending and forming — you need only a screw-driver and wrench. Simple and fast assembly gives you almost any possible combination of rack contacts and arrangements.

You can have the necessary parts for any rack you're likely to need, right in your own stock. A full range of standard parts is available — all you do is clamp the desired contacts on a spine, slide them along to get the desired spacing, and tighten.

No holes to drill — no "not quite right" racks — no big equipment needed — no high cost.

With ERECT-A-RACK you can make up common or really "special" racks — any number of combinations are possible. A few common arrangements are shown above.



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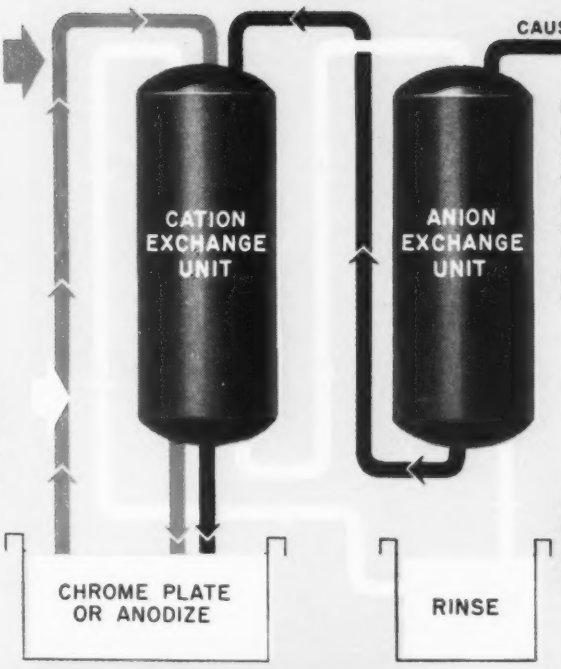
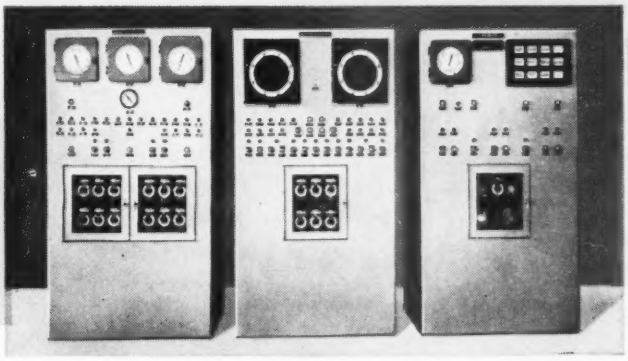
RENEWS PLATING BATH. This cycle removes aluminum, copper, iron and other impurities . . . allows continued re-use of bath . . . eliminates disposal problem. Compared with the usual toxic-waste disposal equipment, ion exchange saves up to 50% on initial costs, 75% on operating costs, 80% on floor space.

RENEWS RINSE WATER. Cation unit removes metallic impurities . . . anion unit removes chromic acid . . . allowing continued reuse of rinse water. Cuts consumption 90%!



RECLAIMS CHROMATE. This cycle picks up chromic acid removed from the rinse water and returns it to the plating bath. Chromate saved in the plating bath and rinse water often pays for the entire ion exchange installation!

SAVINGS FOR SMALL PLANTS. Ion exchange economies apply to small plating plants as well as large.



AUTOMATIC CONTROLS for ion exchangers in an auto parts plating plant. These controls simplify operation. No specially trained operators or technicians required.

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Ion Exchange Cuts Plating Costs

Modern ion exchange equipment really pays off for plating plants. Here's why:

Faster production. Dip periods are shorter, and there's no down-time for dumping because baths are always at full strength. Time savings are biggest for bright-dipping, anodizing, etching, stripping.

Better quality. Clean baths produce more uniform plating deposits. Clean rinses prevent water stains and spots.

Lower operating costs. Contaminant-free baths use less current. The improved quality means fewer rejects . . . and reduced polishing and wiping costs.

A large aircraft manufacturer saved $10,000 on anodizing in the first year with ion exchange. A leading auto maker prevented a stream pollution shut-down, improved quality, reduced costs . . . and uses the same ion exchange equipment for treating other process water in the plant!

Largest manufacturer of ion exchange equipment, The Permutit Company, is the only firm that offers a complete ion exchange service: rinse water or bath analysis, engineering, equipment, ion exchange resins and automatic controls . . . *all from one source.*

For details, write: The Permutit Company, Dept. MF-6, 330 West 42nd St., New York 36, N. Y.

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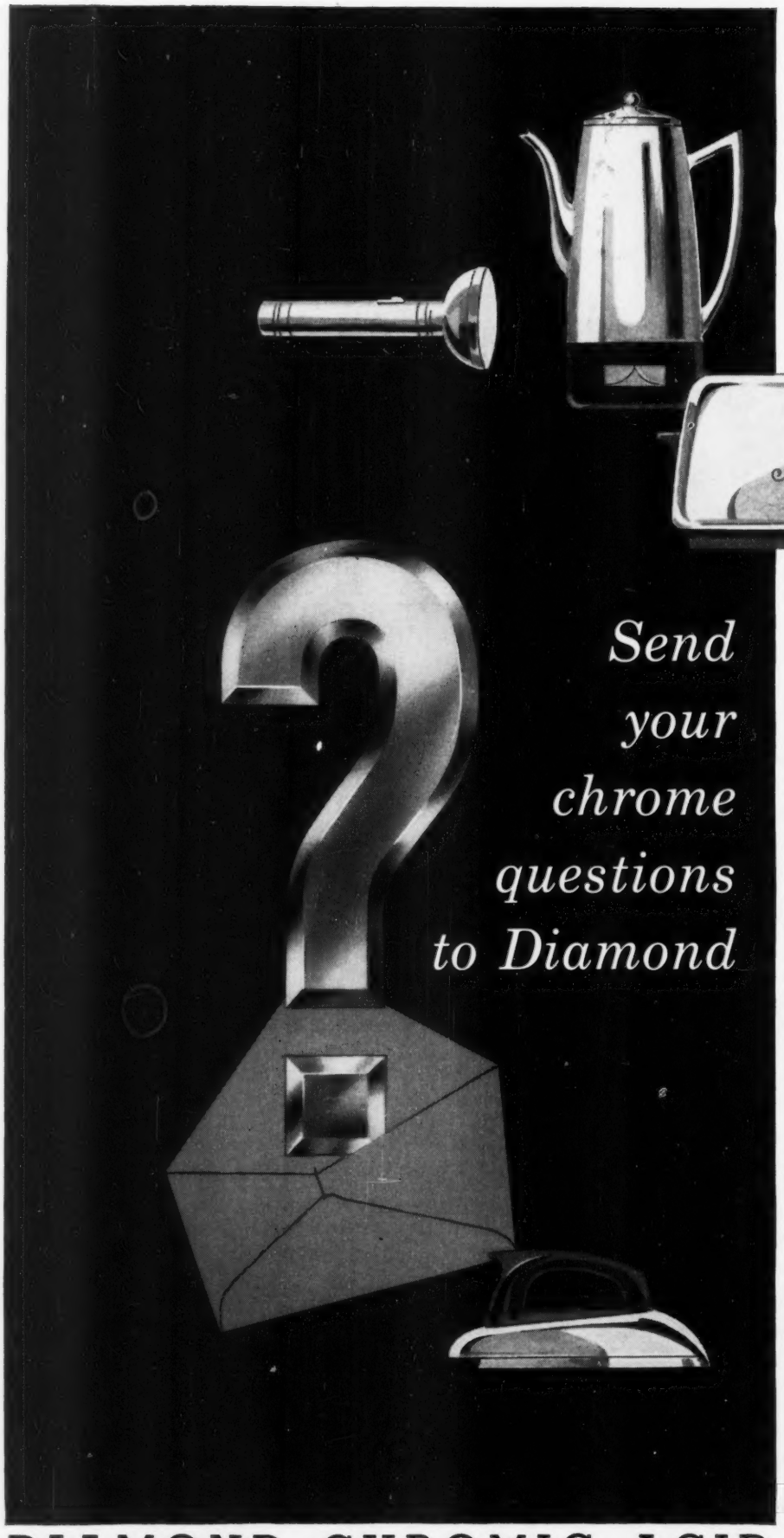
rhymes with "compute it"

ION EXCHANGE

for Water Conditioning • Chemical Processing



If you have a problem connected with chrome plating, bring it to DIAMOND. Our Chromium Chemicals Division is set up to handle your questions . . . completely and quickly. Our technical specialists can draw on a broad technical background plus extensive research and test facilities . . . all you have to do is ask.

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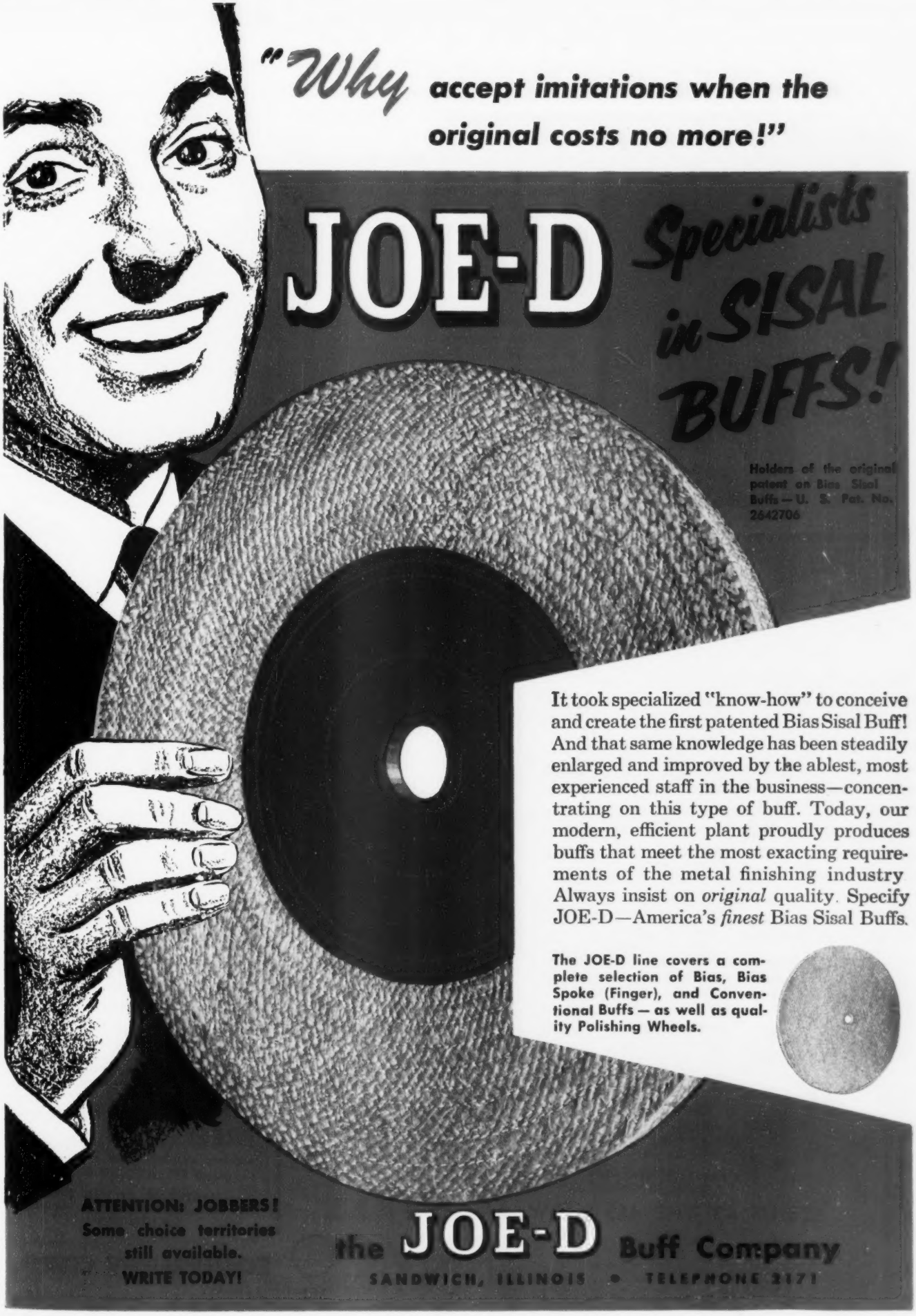
Nine warehousing points and sales offices across the country assure you fast service, uninterrupted supply. DIAMOND ALKALI CO., 300 Union Commerce Bldg., Cleveland 14, Ohio.

DIAMOND CHROMIC ACID

DIAMOND ALKALI CHEMICALS ®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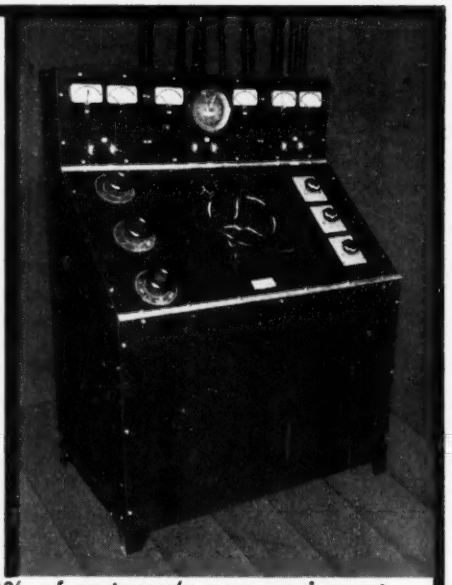
Magnetic Amplifier controlled Constant Current or Constant Voltage Rectifier units . . . either "Selenium" or "Germanium."



From this . . . . . to this, using 80% of customer's own equipment.

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* **SIGHT SORES:** Illness caused by frequent body contortions necessary to read panel instruments.

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MACARR Inc.

RAMCO degreasers

ANOTHER RAMCO PRODUCT

from Laboratory Units to Giants for the Automotive Industry

GIANT FORD DEGREASER
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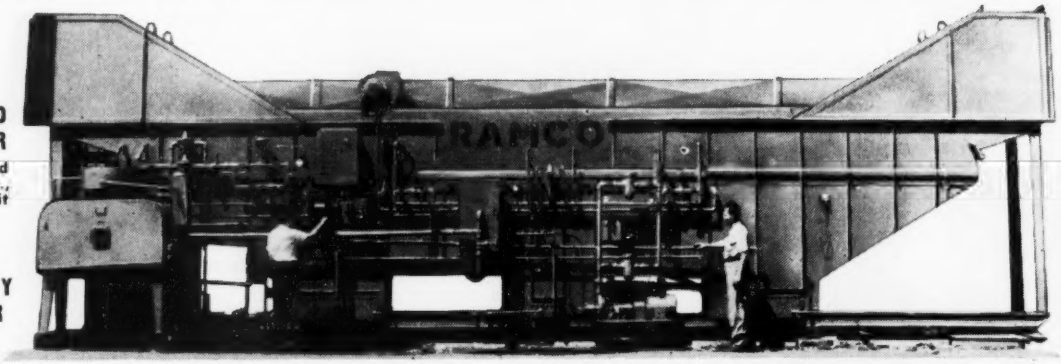

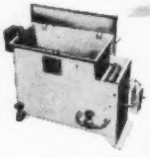

There is a RAMCO VAPOR DEGREASER for every industrial degreasing job. Both standard and custom-designed machines are available; manual or conveyorized. Always the right machine for the job.

. . . RAMCO CONTROLLED DEGREASING EQUIPMENT will do the job better, faster, more efficiently.

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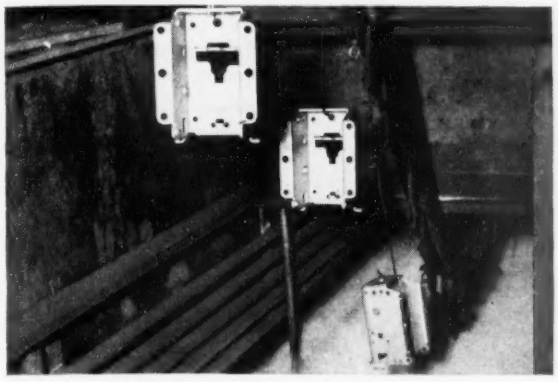
807 Edgewater Rd., New York 39, N. Y. DAyton 3-3900

FOR DEGREASING, DESCALING AND ELECTROPLATING

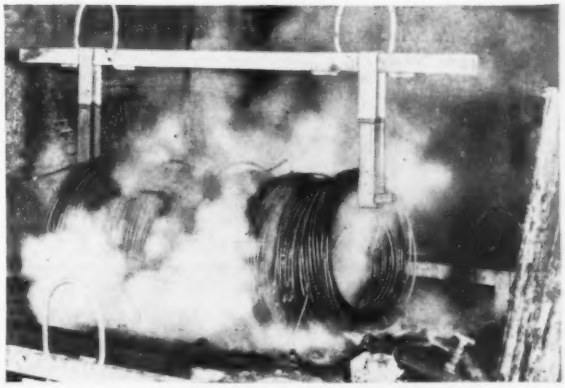
Depend on these Du Pont products and processes



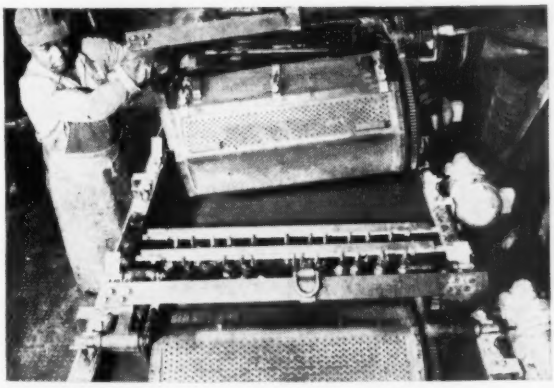
BRIGHT, CLEAN, DRY parts coming from the vapor degreaser after being quickly, economically cleaned with Du Pont TRICLENE D.

FOR VAPOR DEGREASING: You get bright, thorough cleaning for any class work . . . in any vapor degreaser with TRICLENE® D trichlorethylene. An exclusive Du Pont formulation gives it rugged resistance to *all* the major causes of solvent deterioration . . . yet TRICLENE D cleans safely even the most delicate metal surfaces. This means a higher standard of vapor degreasing and reduced maintenance cost . . . at no extra cost to you!

FOR DESCALING: With the Du Pont-pioneered Sodium Hydride Process you can thoroughly descale any metal unaffected by fused caustic at 700° C—*within 20 minutes or less.* And because bath action stops the instant scale is reduced, there's no loss of base metal . . . no pitting or etching to cause costly rejects. Scale-breaking operations, necessary with older descaling methods, are eliminated entirely, and the process is so easy to operate that any pickler can be trained to run it within hours.



AFTER SODIUM HYDRIDE TREATMENT, reduced scale on carbon steel wire is blasted off with a water quench.



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FOR ELECTROPLATING: You can depend on Du Pont plating chemicals and processes for economy and high-quality results—in barrel, still, semi- or fully automatic equipment.

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For Cadmium Plating: CADALYTE® plating salts and chemicals.

For Copper Plating: COPPRALYTE® plating salts.

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For more information on any of these products or processes write to E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware, or call the Du Pont office nearest you.

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Self Priming
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Cap. 100 gal/hr.
H. T. Lucite
Filter Assembly
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pump. Portable-
Wt. . . . 60 lbs.
14"x16"x16" ht.

filter 50-2400 GAL/HR Any Electroplating Solution

A model to fit your needs! . . .

SERVICE . . . Filters practically any acid or alkaline solution from PH 0 to PH 14; removes particles down to one micron in size.

DESIGN . . . Filter Assemblies fabricated of stainless steel 316, H. T. Lucite, Rubber-lined steel, Haveg, Epoxy Resin, Rigid Vinyl, Polyethylene, Teflon, etc.... **Filter Tubes** of cotton, dynel, porous stone or porous carbon...

Pumps fabricated of Hastelloy, stainless 316 or plastic; centrifugal or self priming . . . **Motors**, totally enclosed, ball bearing, choice of current characteristics . . . **Hose** — special acid and alkali resistant . . .

Base — Linen impregnated phenolic laminate on rubber tire, ball bearing casters . . . **Automatic Controls** — on RLS models include magnetic starter, stainless visual bourdon gage and stainless pressure shut-off switch.

Models Centrifugal Pumps	Models Self Priming Pumps	Rated Capacity Gal./Hr.
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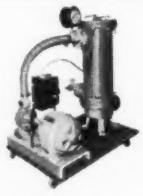
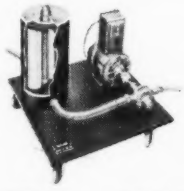
LSI-10	LSIN-10	100 "
ASI-300	ASIN-300	300-450 "
ASI-400	ASIN-400	400-600 "
ASI-600	ASIN-600	600-900 "
RLS-1200	RLSN-1200	1800 "
RLS-2400	RLSN-2400	2400 "

LSI-10 . . Stainless Steel Centrifugal Pump. H. T. Lucite Filter Assembly.



RLSN-1200 . . . Stainless, Turbine Pump. Rubber-Lined Filter Assembly.



ASIN-300 . . . Self Priming, Stainless Pump. Epoxy Resin Filter Assembly.

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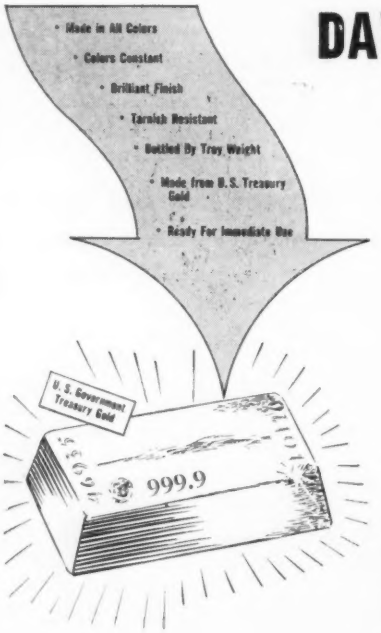

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67% POTASSIUM GOLD CYANIDE SALTS

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LUSTROUS WHITE RHODIUM SOLUTION

THE ONE OUTSTANDING DEVELOPMENT IN GOLD PLATING DURING THE PAST QUARTER CENTURY

DAVIS-K
ONE OPERATION

Antique Gold Solution

TANK RHEOSTATS: We are pleased to announce our variable type tank rheostats which are specially designed for precious metal plating.

DAVIS-K SERVICE: Our service today with its newly expanded facilities is fast and efficient. We are fully equipped to reclaim your old gold and rhodium solutions. Phone or write your precious metal problems. We welcome them!

"Where Glittering Elegance Reflects Lasting Quality."

100% PURE GOLD DKP PRECIOUS METAL SOLUTION

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"tank life DOUBLED with . . .

Cowles NS CLEANER!"

reports large Midwestern manufacturer

That's what happened when this major manufacturer put Cowles NS —heavy duty soak cleaner—in its cleaner tanks. Tank life was doubled, quality of cleaning was improved, and total cost was reduced greatly.

Cowles NS eliminates soap scum build-up to assure long tank life and prevent deposition of scum on cleaned parts. High emulsification properties of Cowles NS keep the tank clear and reduce the costly, time-consuming process of dumping, cleaning and recharging tanks—jobs can be run *up to twice as long* without changing.

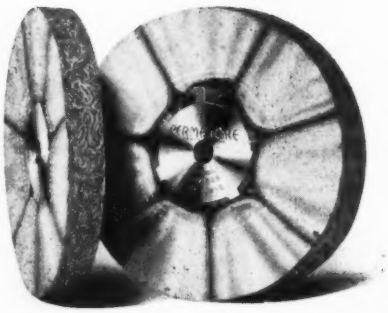
Cowles NS provides outstanding cleaning results and its flexibility permits its successful application in both porcelain enamel plants and in plating plants.

Your Cowles Technical Representative will be very happy to discuss your soak cleaning problems with you and help bring the same exceptional results with Cowles NS that this and many other plants have experienced. Write or call today.

Cowles CHEMICAL COMPANY
METAL CLEANER DEPT.

7016 Euclid Avenue • Cleveland 3, Ohio

PERM-A-CORE



BUFFS

ELIMINATE STREAKS

●

THEY LAST LONGER
AND
REDUCE DOWNTIME AND COSTS

●

THEY CUT BETTER
WITH LESS PRESSURE

●

THEY KEEP THE JOB COOLER

●

THE NEW SISAL
PERM-A-CORE

PRODUCES A

SMOOTHER, MORE UNIFORM FINISH

●

THE MATCHLESS METAL POLISH CO.
ADVANCE POLISHING WHEELS, INC.

840 W. 49TH PLACE
CHICAGO 9, ILL.

726 BLOOMFIELD AVE.
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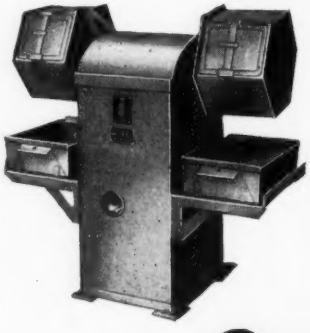
RAMPE TUMBLERS and BARREL FINISHERS

SUPER TWIN BARREL FINISHER

Provides larger volume capacity — 4 cu. ft. (2 cu. ft. per barrel). Sturdily built and powered by a ¾ H.P. 220/440 volt 3 phase motor — Variable speed drive — Barrels can be vinyl plastic lined, if desired. Moveable chutes act as safeguards when tilted to the rear. Tote boxes can be furnished in place of moveable chutes.

Prices — $735.00 to $995.00



TWIN FINISHER

A sturdily built machine that will handle burnishing balls in both barrels — amply powered by a ¾ H.P. 220 volt 3-phase motor. Standard barrels are 10¾ x 17" dia. Standard equipment includes 2 tote boxes and perforated covers for draining liquids from barrels. Barrels can be vinyl coated, if desired.

Prices from $545.00 to $685.00

SINGLE FINISHER

Has hexagon burring barrel of 10¾" x 17" dia. capacity. Operates at 33 r.p.m. with ¼ H.P. single phase motor. Automatic slack take-up on turntable belt. Furnished with unlined barrel or lined with vinyl plastic, as desired.

Prices from $218.00 to $298.00

ADJUSTABLE TUMBLER

This model tilts through a 90° arc to position barrel for any kind of tumbling. Burring barrel or most any kind of container can be used. Powered with 1/6 H.P. 110 v. single phase motor.

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SCREEN SEPARATOR

Built for standard 24" diameter Foundry Riddle or 24" x 24" square screen. Length of stroke of screen movement adjustable from 0-1½" by loosening one bolt. Operated by a ball-bearing A.C. motor through novel design nylon eccentric bushing.

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Write for complete information. Dealer Inquiries Invited.

See our Exhibit at Industrial Finishing Exposition, June 20-23, Cleveland, Ohio.

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14915 WOODWORTH AVE., CLEVELAND 10, OHIO

WYANDOTTE ANNOUNCES

a superior electrocleaner for nonferrous metals in automatics or hand lines

Laboratory and production tests prove that Wyandotte's new electrocleaner, LECTRITE-NF, improves results, cuts costs! It does an outstanding job on nonferrous metals, especially brass, and provides the following advantages:

INHIBITED

to prevent etching, staining, excessive oxidation, clouded plate — during cleaning as well as in long transfers.

FORTIFIED

for exceptionally high detergency, soil tolerance, and long use-life which insures lower use-cost for you.

BALANCED

for fast and complete wetting, free rinsing, controlled foam blanket which assures uniform, more efficient processing.

VERSATILE

New LECTRITE-NF is effective in hard or soft water, on brass, copper, copper alloys, zinc-base diecastings, and other special alloys. For single-tank reverse-current electrocleaning, or where two-stage direct and reverse cleaning is employed.

Wyandotte offers a complete line of performance-proved metal cleaners, phosphatizers, paint strippers, and related products. Each is specially prepared to give optimum results at lowest use-cost. Write today, stating your metal-cleaning problem or application, for complete facts and demonstration. *Wyandotte Chemicals Corporation, Wyandotte, Mich. Also Los Nietos, Calif.*

Wyandotte
REG. U. S. PAT. OFF.
CHEMICALS

Helpful service representatives in 138 cities in the United States and Canada

MAIL NOW FOR DATA AND DEMONSTRATION

Wyandotte Chemicals Corporation, Dept. 2300
Wyandotte, Michigan

☐ Send more data on the use of new LECTRITE-NF.

☐ Have representative call.

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Now Proudly Offers Aluminum Protection

in either clear or colored finishes with

New Luster-on® Aluminum Sealer

- Replaces anodizing where hardness is not prime factor
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- Gives salt spray resistance to 600 hours
- Applies easily in one dip at room-temperature
- Adheres well, does not leach easily
- Offers extreme economy of use

Send samples for free laboratory treatment. See superior results with your own eyes.

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First name in chemical-resistant plastic . . .

TANKS
HOODS
DUCTS
STACKS

Will display a 20′ HIGH EXHAUST STACK in actual operation

Typical of the standard duct and stack sections easily ordered and erected by platers for tank fume removal.

Write for new data sheet brochure on Pla-Tank Products for the Plating Industry.

PLA-TANK, INC.
Division of
THE CHEMICAL CORP.
Dept. MF
WEST WARREN, MASS.

Used Throughout the Plating Industry

Developed and manufactured by experienced platers

MICCROSOL . . .
Today's outstanding heat-cured rack coating that provides positive insulation and protection, amazing tensile strength and scuff resistance, permanent flexibility, and positive, continuous adhesion.

MICCROTAPE . . .
An extruded tape that offers unexcelled protection for plating racks, and for masking parts prior to selective plating.

MICCROTUBE . . .
An extruded tubing especially suited for use on straight or bent contact wires, and for selective plating of simple parts.

MICCROTEX . . .
A synthetic air-dry rack coating for all plating cycles and phosphate coatings—highly resistant to all plating solutions.

MICCROSTOP . . .
For masking of machined parts for all plating cycles. Hairline demarcation . . . extreme accuracy.

MICCROMASK . . .
For masking of machined parts for hard chromium plating. Provides complete protection—assures extreme accuracy.

MICCROPEEL . . .
Specifically designed to supply the need for a stop-off lacquer that can be peeled easily from the part after plating, and will hold a hairline demarcation through all plating cycles.

MICCROLAC . . .
Mirror-finish, water-white lacquer that protects and beautifies the finest of polished or plated metals.

MICCROSTRIP "A"...
A blend of the new fast solvents for the quick, easy removal of stop-off lacquers in selective plating.

MICCROLOID . . .
Industrial corrosive-resistant coating for use on all plating equipment, rinse tanks, structural steel, walls, floors, pipe lines, air ducts, etc.

MICCROWAX . . .
Two widely used waxes for selective stop-off, especially suited for masking on complicated parts and sharp edges. C-562 for hard chromium; C-600 for high-temperature cycles.

Samples and descriptive literature of all Miccro Products will be sent upon request.

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use **SMOOTHEX**

anti-fume **PELLETS**

Dragout . . . Spray . . . or Mist from chromic acid cost you money in material, health, lost production and machine and equipment damage.

You can reduce this waste, drastically, economically! A few, long lasting, low cost, Smoothex Anti-Fume Pellets miraculously control chromic acid and help to prevent its escape in the form of fumes, spray and dragout.

Pellets will not break down under normal plating conditions. The occasional addition of a few pellets, constantly maintains reduced surface tension in the bath.

Because Smoothex Anti-Fume Pellets cost so little and save so much . . . You'll want to use them, in your plant, right away!

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You'll SAVE MONEY and PROTECT HEALTH, too!

SMOOTHEX, INC.

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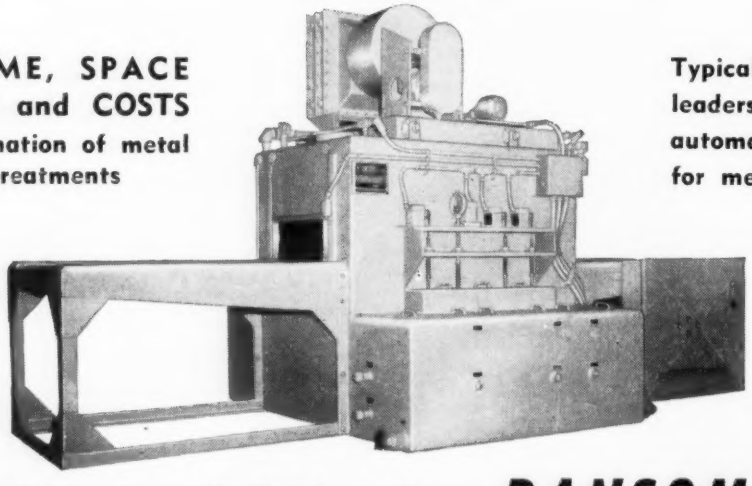
SAVES TIME, SPACE HANDLING and COSTS
on any combination of metal surface treatments



Typical of Ransohoff leadership in creating automatic equipment for metal finishing.

New "Walking Spray" Cabinet Type *RANSOMATIC*

offers a big opportunity for economy if you now use still tanks

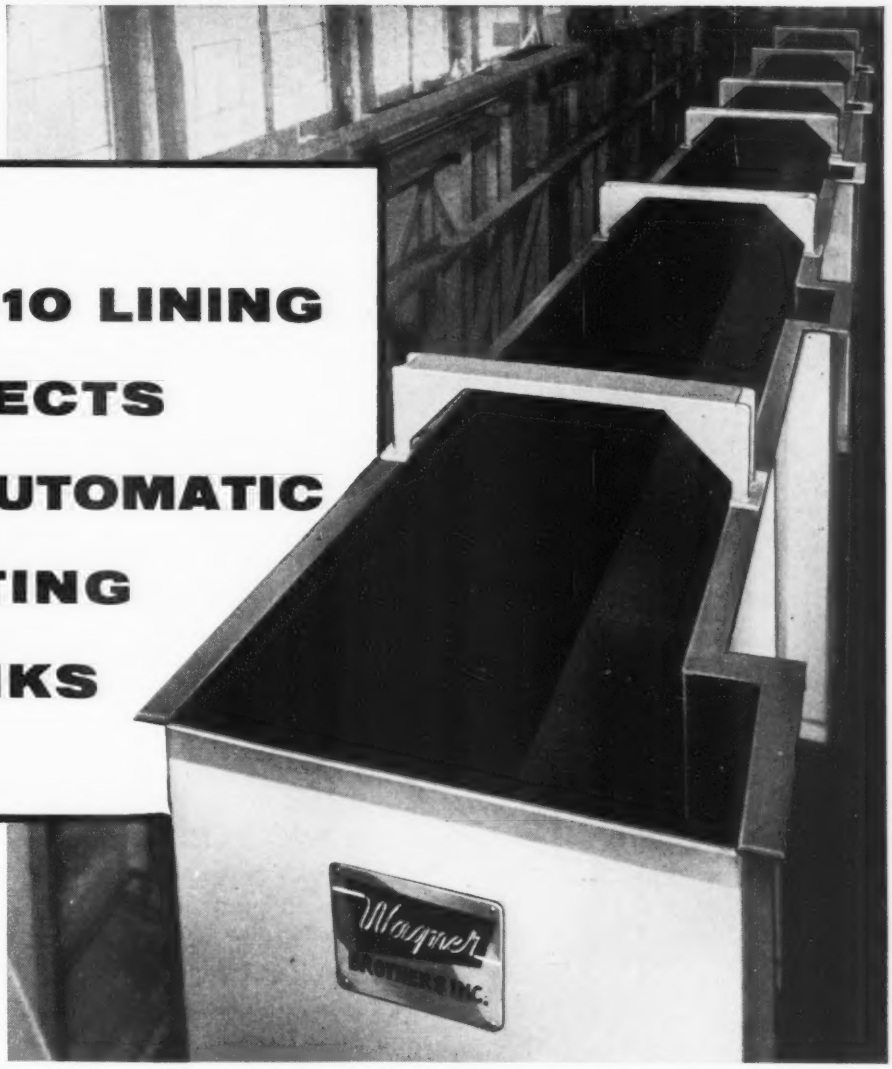
Just roll a batch of work into the cabinet of a Ransomatic, press a button, and the work will be treated with any pre-determined sequence of solutions and rinses — thoroughly, accurately and efficiently. Can be built for any size work or any number or combination of solutions. Also built in drum type for work that can withstand rolling. Send for complete details.

REPRESENTATIVES IN PRINCIPAL CITIES

RANSOHOFF, INC.

630 NORTH FIFTH ST. HAMILTON, OHIO

VYFLEX L-10 LINING PROTECTS WAGNER AUTOMATIC PLATING TANKS



No wonder Wagner Brothers, Inc., Detroit, Michigan wanted the best possible lining protection for their famed automatic plating machines. Representing a small part of the original cost of each Wagner machine, the linings go a long way toward protecting each customer's total investment. Here's why Wagner, after rigorously testing all available materials, decided to standardize on Kaykor's Vyflex L-10 tank linings:

- Vyflex L-10 excels in all four important categories of lining performance: corrosion resistance . . . electrical insulation . . . strength, toughness, and elasticity . . . fool-proof application.
- The highly polished exposed surface of Vyflex L-10 assures easier cleaning, better solution flow, less hang-up on tank walls.
- Available in black or white in standard thicknesses of $\frac{3}{32}$" and $\frac{3}{16}$". Vyflex L-10 white has superior color stability, will not turn yellow.

The uses of Vyflex L-10 linings extend far beyond automatic plating tanks . . . including the protection of every type of equipment subject to corrosion. Qualified Kaykor applicators across the United States and Canada give fast, professional service applying Vyflex L-10 to steel, wood, concrete, in the field or in the shop.

GET THE FACTS! Write today for the complete story on Vyflex L-10 in "Facts You Should Have", free on request.

VYFLEX® KAYKOR
TRADE MARK REG. U.S. PAT. OFF.
INDUSTRIES, INC.

Division of Kaye-Tex Manufacturing Corp.

KAYKOR INDUSTRIES, INC.
4403 Broad Street, Yardville, New Jersey

Gentlemen:

Please send me, without obligation, the complete details on Vyflex L-10 in "Facts You Should Have On Vyflex L-10".

I would also like to have information on the other Vyflex products. ☐

NAME_____ POSITION_____

COMPANY_____

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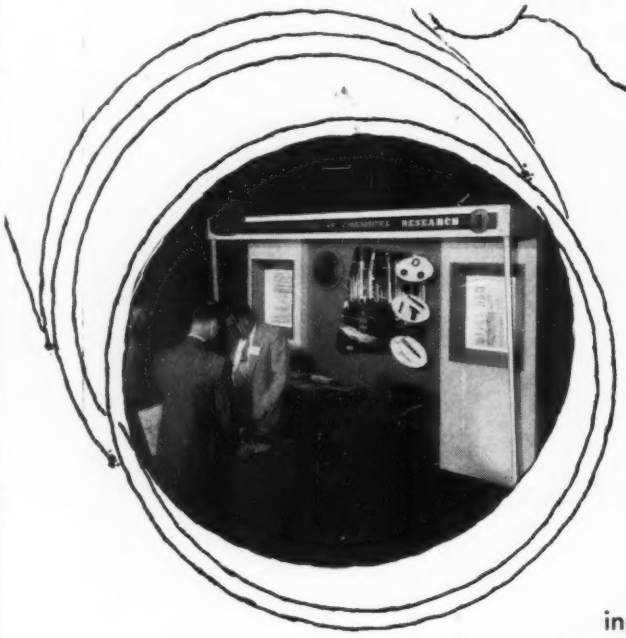
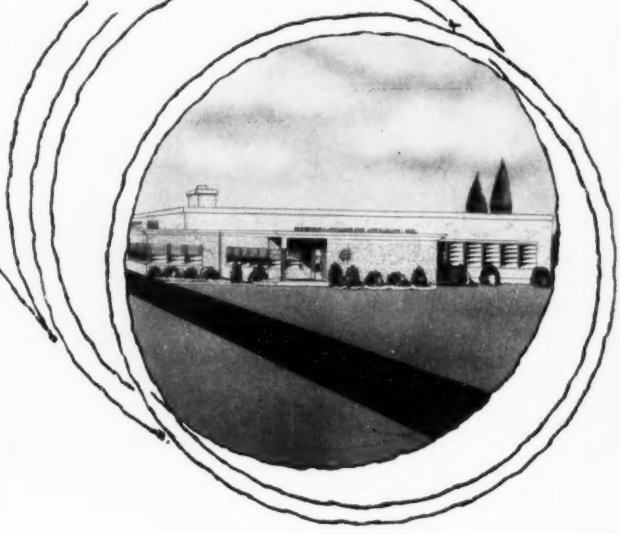
LOOK to MITCHELL-BRADFORD

FOR LEADERSHIP IN METAL FINISHING





We look forward to seeing you at the Mitchell-Bradford Booth Nos. 344 and 345. This will be an opportunity for you to discuss your blackening, rust preventative, metal finishing and cleaning problems with our capable chemical engineers. Your visit may mean a better product, lowered costs and the solution of knotty production problems for you as it has for many leading manufacturers.

We have just completed and now occupy our new, modern laboratories and plant in Milford, Connecticut. These new facilities will enable us to give the best quality and service that will guarantee trouble-free production. We invite you to visit our new home and see for yourself why Mitchell-Bradford maintains its leadership through constant research, quality control and service.

Beauty and Protection That Puts Your Product Out in Front

A comprehensive study of the application of black oxide finishes has been compiled and is now available in our latest catalog. The study covers Black Magic-Blackening Processes for ferrous and non-ferrous metals; metal cleaners, rustproofing oils and waxes, plating specialties and a complete line of heat treating salts.

Write for your complimentary copy today.

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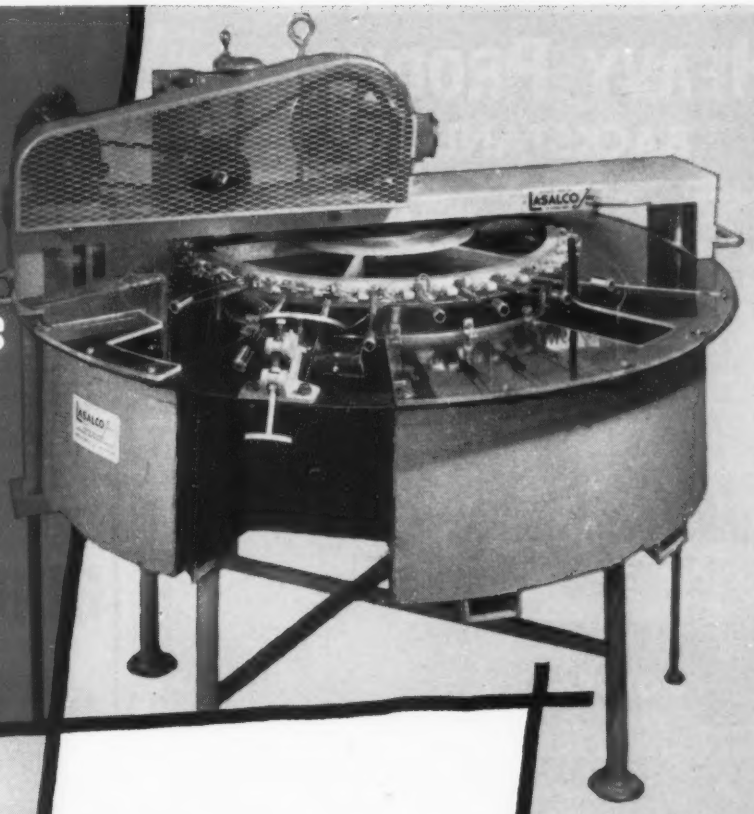
WAMPUS LANE **MILFORD, CONN.**

QUALITY PRODUCTS OF CHEMICAL RESEARCH

Chrome Plate over 3200 Pieces Per Hour with One Operator!



LASALCO's *New* CIRCULAR CHROME PLATER

Cost-cutter . . . time-saver . . . production-booster! Consider the unusual extra profit possibilities with this new high current density, continuously-moving cathode chrome plater:

- Exceptionally high output—3290 pieces, up to 3" long, per hour at 23 seconds. Minimum output, 530 pieces per hour at 2.39 minutes. (Alternate slower drives for heavier plating.)
- One-man loading . . . fully automatic unloading.
- No racks . . . no rack upkeep.
- Easily removable sectionalized cover of Plexiglas, plus easy-to-raise driving mechanism and cathode wheel, gives quick access to coils and anodes. Parts falling into tank are instantly recoverable.
- Simple installation requires only electrical connections and exhaust duct. Plater delivered complete, ready to install.

Write Now . . . Get The Facts About This Money-Maker

SPECIFICATIONS

Cathode Wheel Diameters 30", 31". Bronze Work Carriers 3.24" O.C. Effective Plating Travel 68.4".
Inner Anode Diameter 24"; Outer Anode 40".
Center Of Anode To Cathode 4".
Tank Diameter 54"; Depth 14". 3/32" Koroseal Lining.
Solution Capacity 115 Gals. 2" From Top.
Anodes: Flat 16 lb. 6% Antimonial Lead—Outer ¼"x9"x7'5"; Inner ¼"x9"x4'4". Anode and Cathode Taps ⅛"x2". Copper Bars.
Bused For 500 Amps.
Heating (Standard): ¾" I.D. 6% Antimonial Lead Steam Coil. (Available For Electric Heating.)
Drive: ¼ HP 110/220 1- Phase 60 Cycle AC Motor. Variable Speed Reduction.

LASALCO, INC.

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HEAVY PRODUCTION
BACKSTAND IDLERS

Universal Model—
Sets on floor; mounts on wall or ceiling.

Features of BELT MASTER BACKSTAND IDLERS

- *Increased production*—Tracking and belt tension controlled from operating position.
- Saves Belts—Tracking adjustment moves idler pulley from side to side instead of turning the face—avoids twisting and stretching to break the bond.
- Tracks all belt widths, ¼ to 6", perfectly.
- Quick Belt Change. A single motion releases or tightens belt.
- Balanced, 10" idler pulley, 5" wide, with closed ends.
- Grease-packed heavy duty Seal Master ball bearings.
- **Proved on the Heaviest of Heavy production lines.**

Pedestal Base Model—
keeps belt level

Order from your Jobber or write for literature

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The Revolutionary NEW

BURNISHING FORMULA

specially developed to produce

***the* COLOR *and* LUSTRE**

YOU WANT ON

- **ALUMINUM**
- **ALUMINUM DIE CASTINGS**
- **ZINC DIE CASTINGS**

• BRASS • COPPER • STEEL
• WHITE METAL • SOFT SOLDERS

Works in All Hard Water Areas

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415 Greenwich St., New York 13, N. Y.
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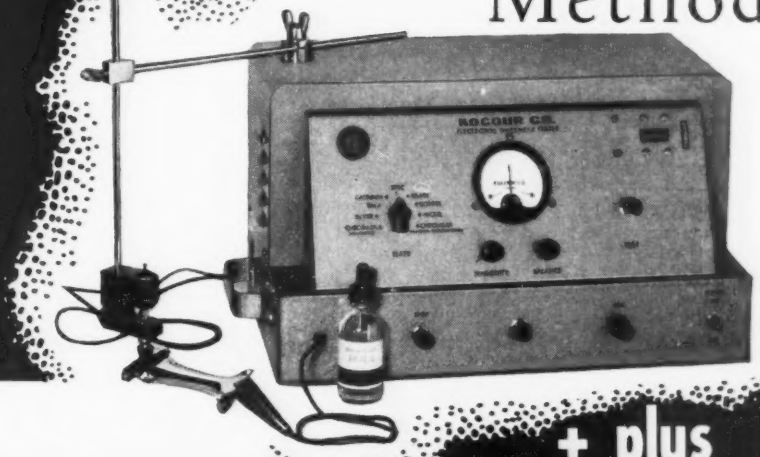
Check plating thickness

WITH THE

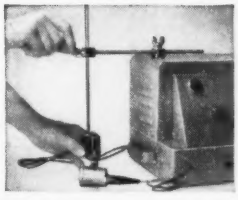
KOCOUR ELECTRONIC THICKNESS TESTER*

*Anodic Solution Method



6 Simple steps . . . to quick, accurate results

1.

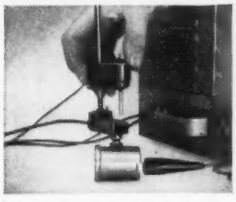


MOUNT THE CELL . . . on the spot to be tested and clip lead wire to specimen.

2.

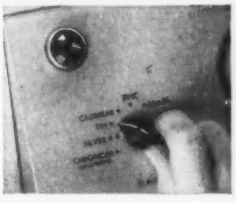
ADD TEST SOLUTION . . . which corresponds to the type of plating and base metal tested.

3.



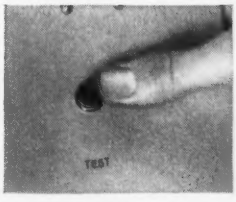
PLACE STIRRER IN POSITION.

4.



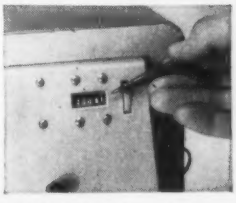
SET SELECTOR SWITCH to the type of plating to be tested as indicated on panel.

5.



PRESS THE TEST BUTTON to start the test . . . and upon completion the unit shuts off automatically.

6.



TAKE THE READING directly from the counter on panel i.e., 0.00041".

TOTAL TIME . . . *less than* 2 minutes

+ plus these features

- **DETERMINE THICKNESS OF**
  - decorative chromium
  - heavy chromium
  - silver
  - tin
  - cadmium
  - zinc
  - copper
  - brass
  - nickel
  - lead
  - lead-tin alloy
  - tin zinc alloy

  on various base metals and materials
- **WIDE THICKNESS RANGE**
- **DIRECT READINGS**
- **90-95% ACCURACY**
- **TESTS ARE RAPID**
- **VIRTUALLY AUTOMATIC**
- **ELIMINATES HUMAN ELEMENT**

Don't delay! See how the Electronic Thickness Tester can solve your problem. Write for literature today.

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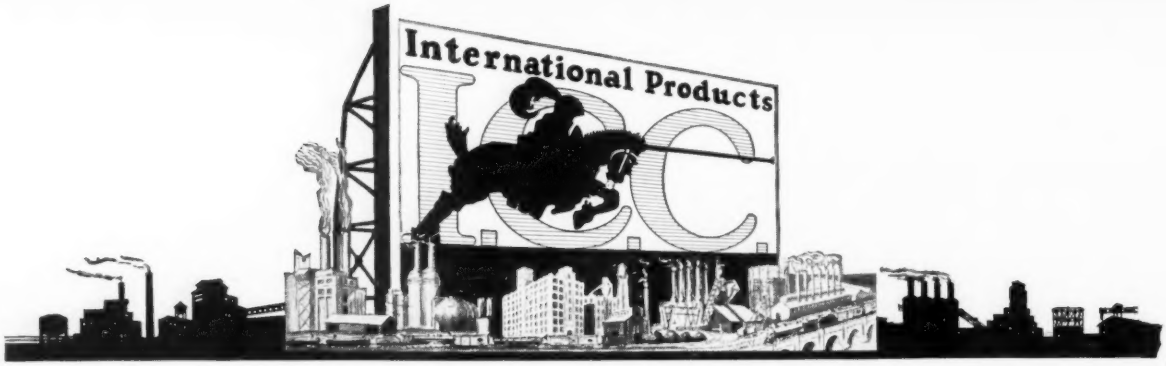
SEE US . . . BOOTH 442 . . . METAL FINISHING EXPOSITION IN CLEVELAND



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SOAK TANK • ELECTROPLATING • WASH TANK

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FUSED QUARTZ IMMERSION HEATERS

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Dependable, controlled heat at low operating cost.

Wide range of Standard Sizes for every need.

Only Fused Quartz Heater recommended and sold by all leading plating supply houses.

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STEEL AND STAINLESS IMMERSION HEATERS

Specify CLEPCO Non-Magnetic Stainless Steel Heaters for your alkaline electro cleaners and bright copper plating tanks.

Specify CLEPCO Steel Heaters for all other alkaline tanks.

All leading Plating Supply Houses can furnish from stock.

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Clepco

WRITE US FOR LITERATURE

CLEVELAND PROCESS COMPANY

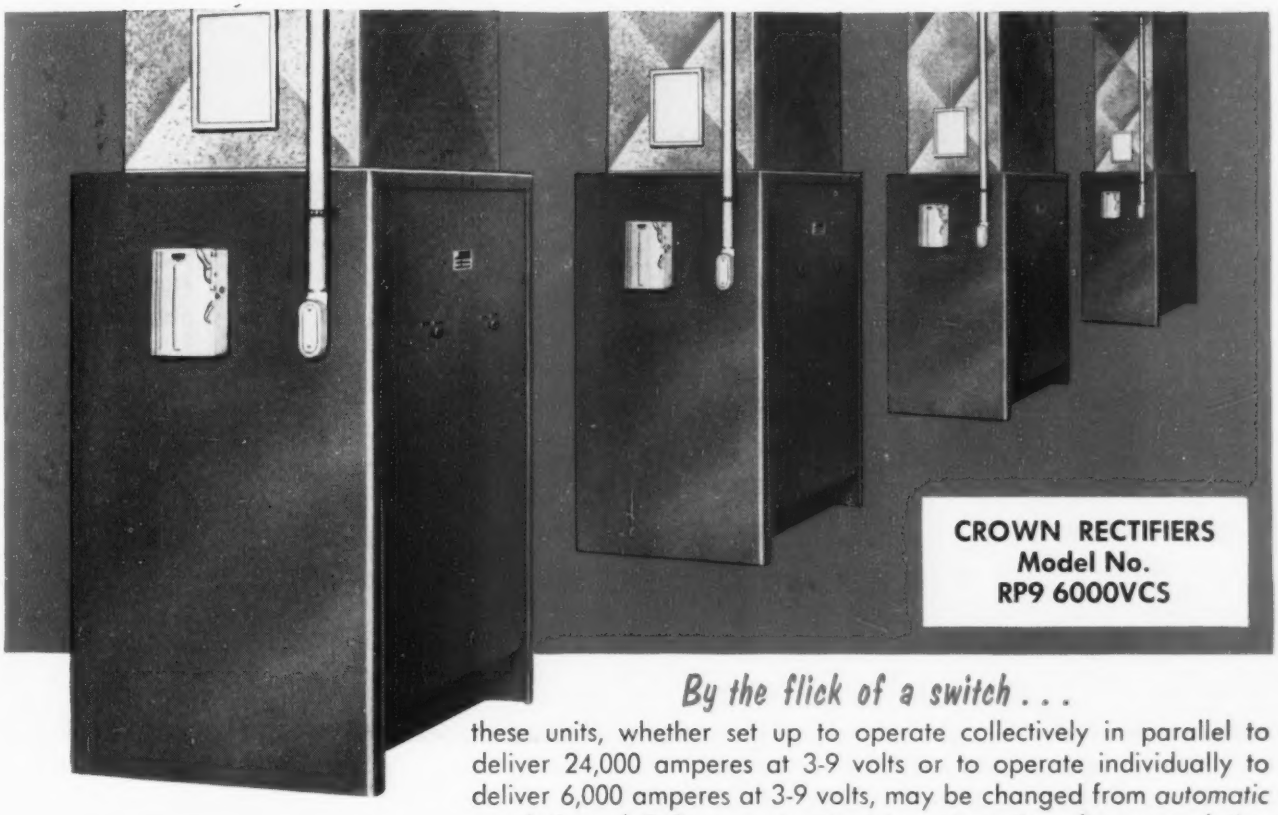
1965 EAST 57th STREET

CLEVELAND 3, OHIO

Why Spartan Engineering Installed . . .

CROWN RECTIFIERS

Spartan's expanded operation demanded the utmost in **FLEXIBLE POWER SUPPLY.** The performance of the four rectifiers illustrated below, serve as an example of how **CROWN RECTIFIERS** met these stringent requirements in every instance.



By the flick of a switch . . .

these units, whether set up to operate collectively in parallel to deliver 24,000 amperes at 3-9 volts or to operate individually to deliver 6,000 amperes at 3-9 volts, may be changed from *automatic regulation of D.C. current output* to *automatic voltage regulation of D.C. output (with upper current limiting*.)*

By the flick of a switch . . . .

these units can be changed from automatic regulation to manual control regulation.

To the best of our knowledge, no other rectifier installation can match this for flexibility of power supply. This adaptability to specific requirements, plus the high quality of materials and careful workmanship that goes into each unit make CROWN RECTIFIERS ideal for the most complex electro-chemical operation.

**Automatically prevents current overload without shutting off unit, eliminating all possibility of damage due to excessive tank loads.*

DEPENDABLE
D. C.
POWER
for electro-chemical requirements

Crown **SELENIUM RECTIFIERS**

***Manufactured by* CROWN CHEMICAL AND ENGINEERING CO. • 4722 Worth Street, Los Angeles 63, California**

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THE CHEMICAL CORPORATION, Springfield, Mass. • CROWN RHEOSTAT & SUPPLY CO., Chicago, Illinois
R. W. RENTON & CO., Cleveland, Ohio • SOMMERS BROS. MFG., St. Louis, Mo. • GEORGE V. MORRIS, Philadelphia, Pa.
W. M. FOTHERINGHAM, Buffalo, New York • MITCHELL EQUIPMENT CORP., Sylvania, Ohio

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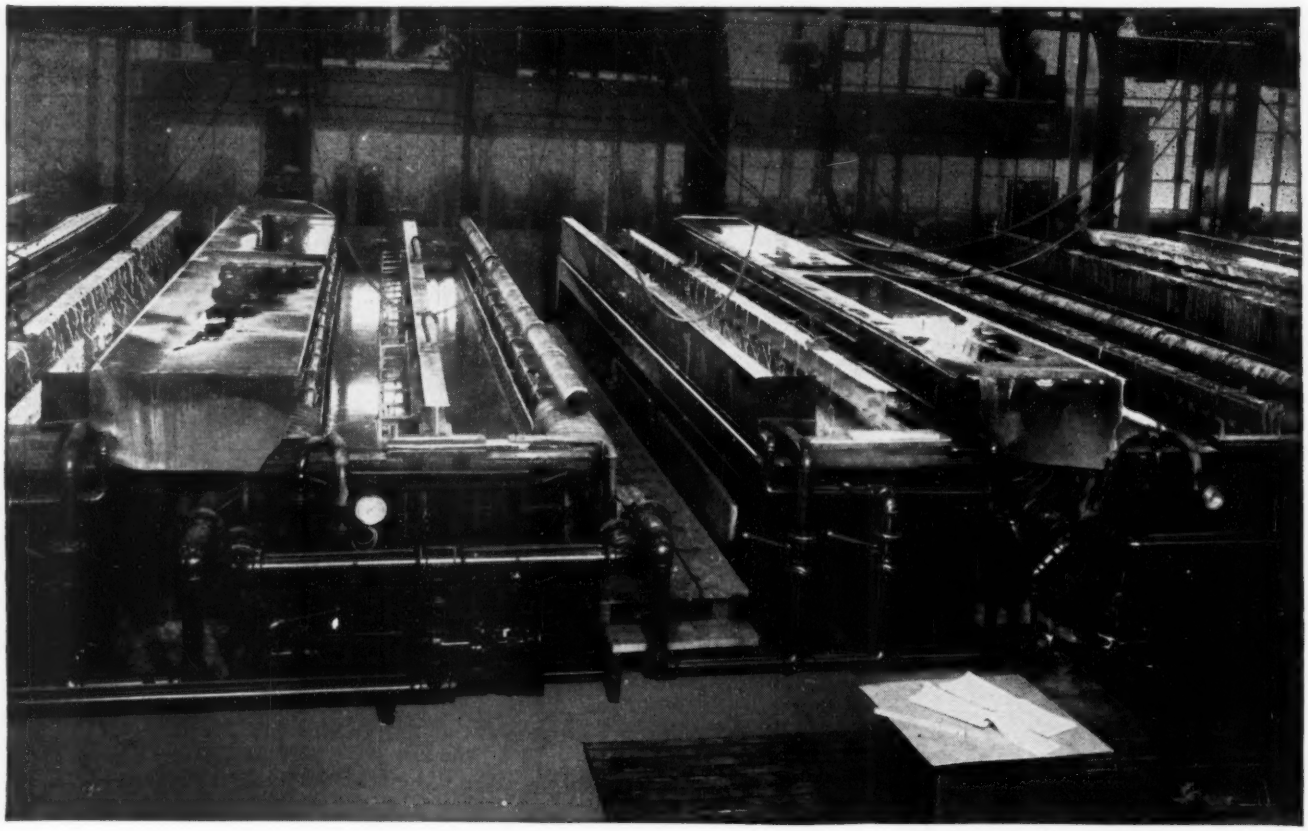

A typical large Haveg pickling tank installation.

Metal Finishing Corrosion has been Controlled!

All Haveg equipment has extra long life, extreme resistance to corrosive chemicals, and can be used continuously in a high range of process temperatures with complete safety and a proven history of performance.

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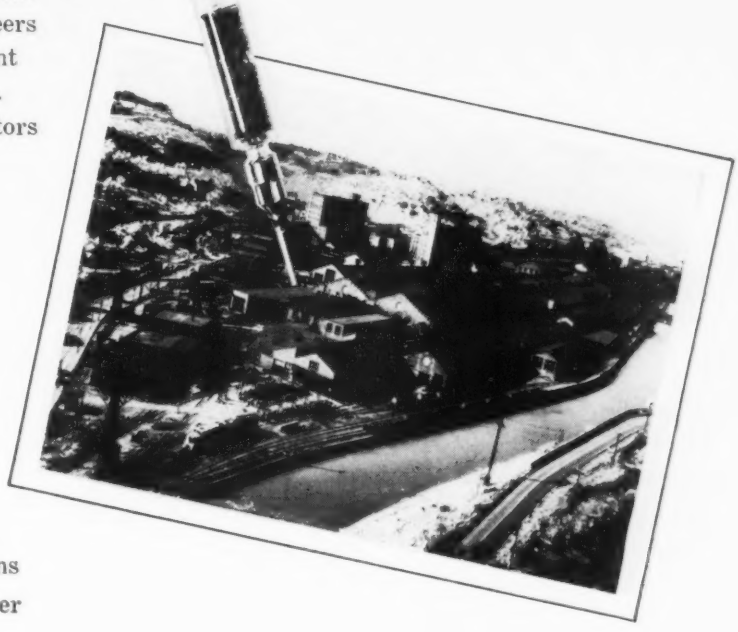

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WC-103 A — Reactivators • WC-111 — Ion-Exchangers
T-136 — Plating Waste Solutions — Recovery or Disposal
T-130 — Ion Exchange A Practical Tool in the Plating Room
T-123 — Applications of Ion Exchange to Plating Plant Problems

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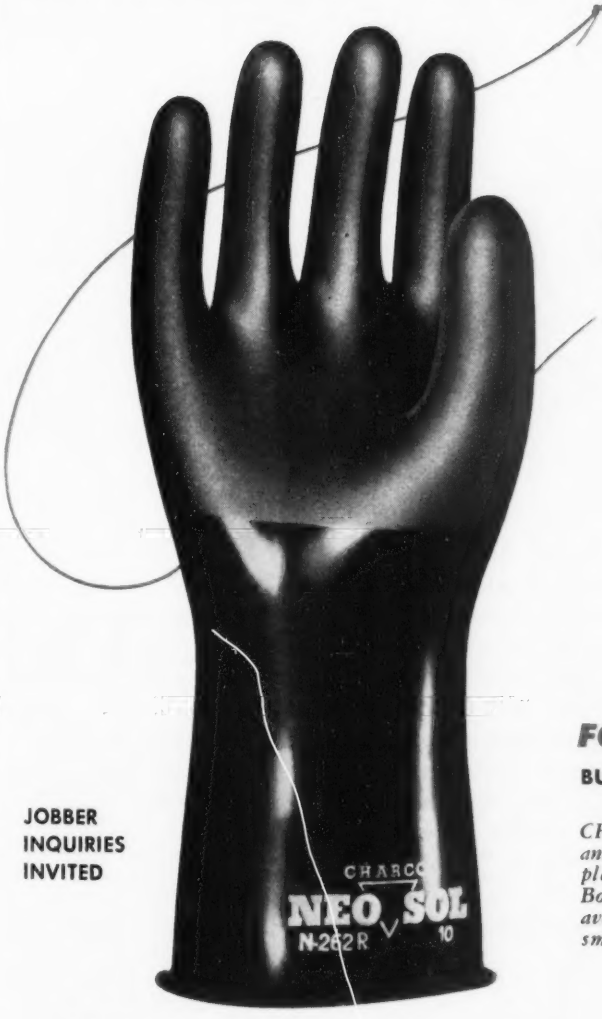

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THE PLACE: CLEVELAND PUBLIC AUDITORIUM

THE TIME: JUNE 20, 21, 22, 23, 1955

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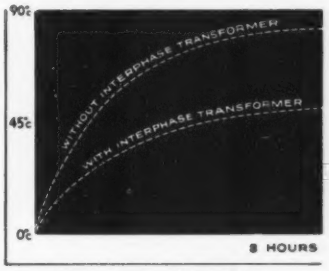
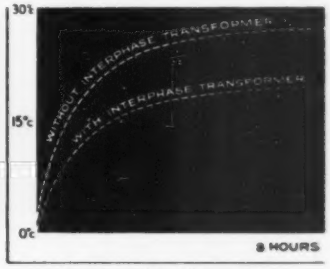
TEMPERATURE RISE

The curves are actual temperatures, recorded with and without the interphase balancing transformer — more proof of circuits versus selenium area.



Transformer Heat Rise



Selenium Cell Heat Rise

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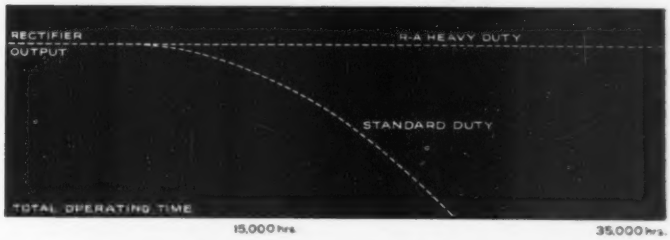

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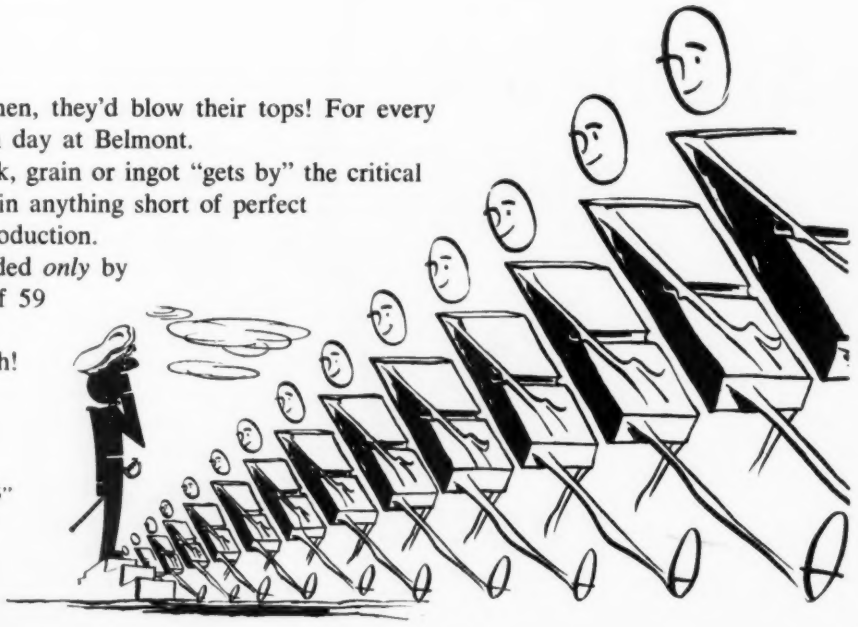
Better buy Belmont . . . for both!



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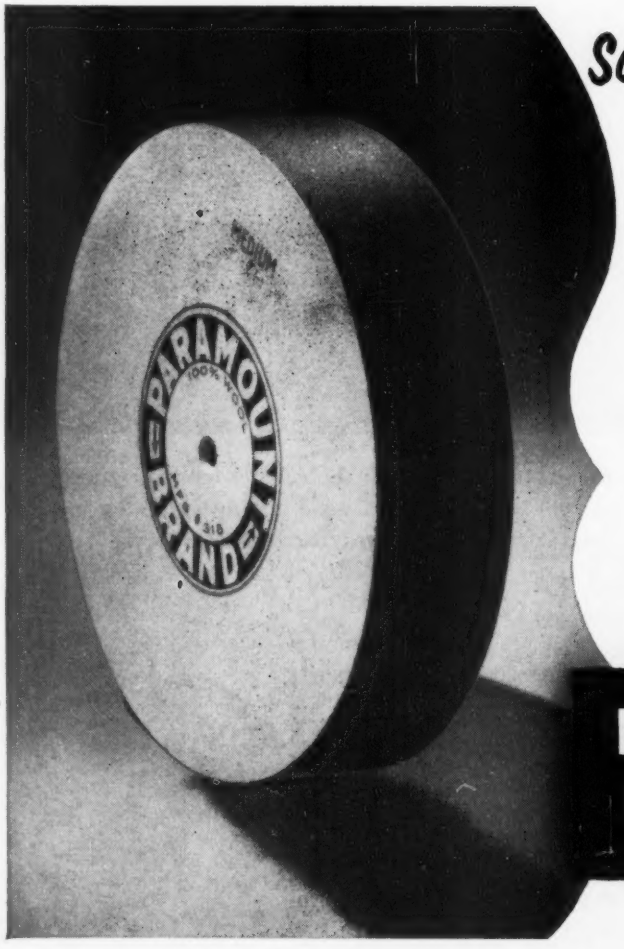

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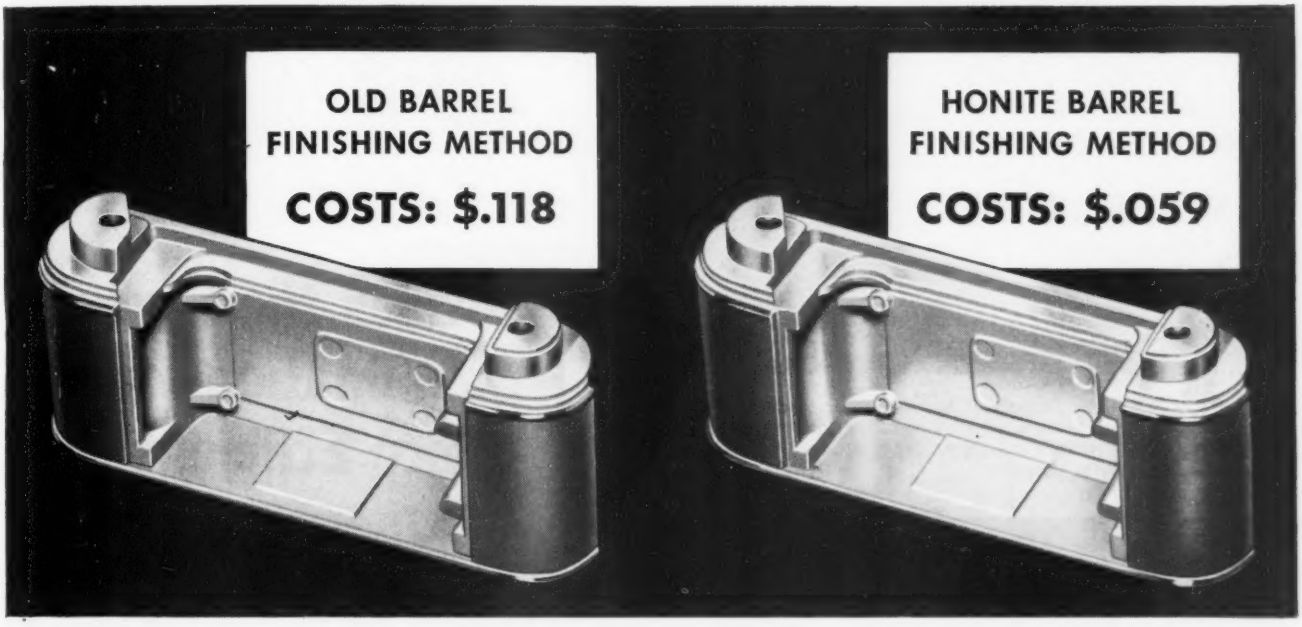
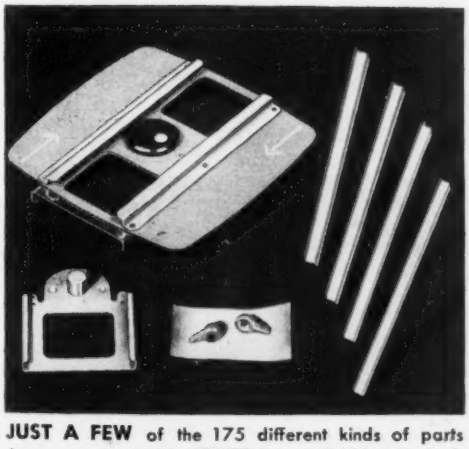


50% saving when manufacturer changes barrel finishing method



JUST A FEW of the 175 different kinds of parts Argus processes with HONITE Barrel Finishing Method.

Argus Cameras, Inc., Ann Arbor, Michigan, had been using barrel finishing since 1945—processing 175 different kinds of zinc, aluminum and steel camera parts such as those shown above. Last year HONITE Field Engineer D. J. Jones supervised a change to the HONITE Barrel Finishing Method.

Sample results? Recommended HONITE procedure helped cut finishing time on zinc die-cast levers from 36 hours to 15 hours—a time-saving of 58%. Costs of deburring and polishing aluminum camera-case castings were reduced from $.118 per unit to $.059.

Now—the company has found that the HONITE method cuts costs, increases production on intricate parts of all sizes. As many as 500,000 parts are processed weekly.

Your HONITE Field Engineer or nearby HONITE Distributor is a barrel finishing expert who can help *you* cut barrel finishing costs, too. Call him today!

Remember, too, the HONITE Division of the 3M Company supplies a *complete line* of abrasives, chips, compounds and equipment for every barrel finishing need. For complete information about HONITE products, write for free copy of booklet, "Facts and Figures Report on HONITE Barrel Finishing".

MINNESOTA MINING AND MFG. CO.
Dept. MF-65, St. Paul 6, Minn.

☐ Send me free copy of "Facts and Figures Report on HONITE Barrel Finishing"
☐ I'd like to talk with a HONITE Sales Engineer.

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COMPANY.....

CITY..... ZONE... STATE.....

TYPE OF PRODUCTS TO BE FINISHED.....

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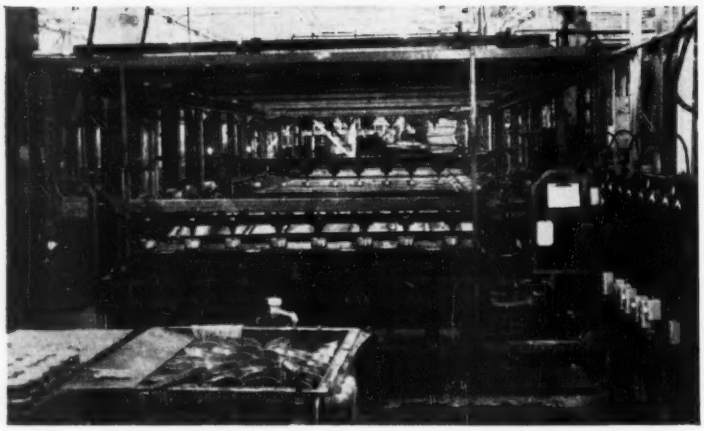

U.S. Fully Automatic Equipment for processing and heavy copper plating the bottoms of popular brand stainless steel cooking utensils. 10 such U.S. installations are in service in 3 plants of this manufacturer.

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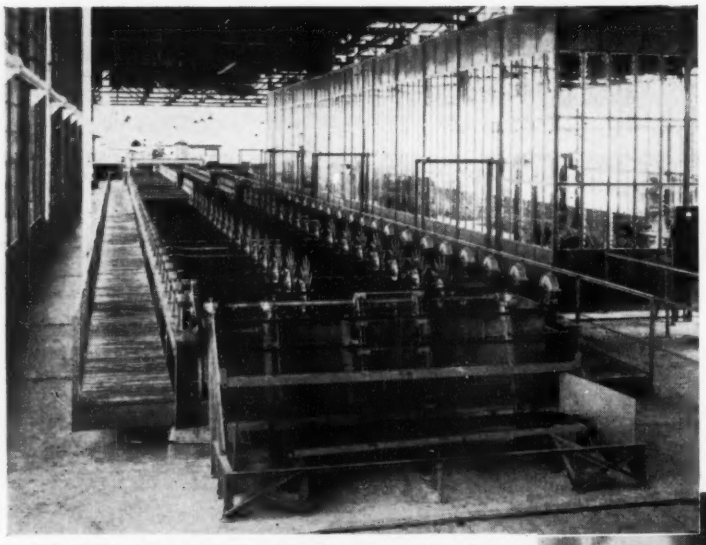
Since 1896

Provides the Right Combination for More Efficient Operation

U.S. Equipment leads where production problems call for ingenious engineering and design for improving quality and lowering costs. Whether your job calls for Electroplating, Electrochemical Treatment, Metal Cleaning, Pickling, Acid Dipping, Drying or other related operations in any required series or combination —intermittent or continuous—it will pay to get U.S. recommendations. Our Service Department is at your disposal, without obligation.



U.S. Fully Automatic Conduit Pipe Processing Installation. Performs 24 operations in one continuous cycle including cleaning, acid treatment, zinc plating pipe exterior, enamelling and baking interior surface. Capacity—over 60 million feet of pipe per year. Glass enclosure houses U.S. Generator Equipment.

U.S. Automatic Machine for processing tubular steel furniture components. Performs 22 operations automatically including cleaning, copper, nickel and chrome plating and drying in one continuous cycle. Has 5 parallel processing lanes; each can take different kinds of material.

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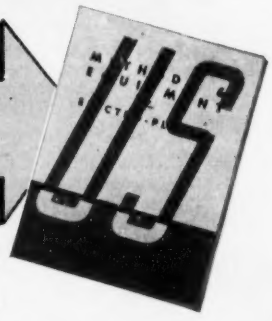

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METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

JUNE, 1955 Volume 53 Number 6

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News about
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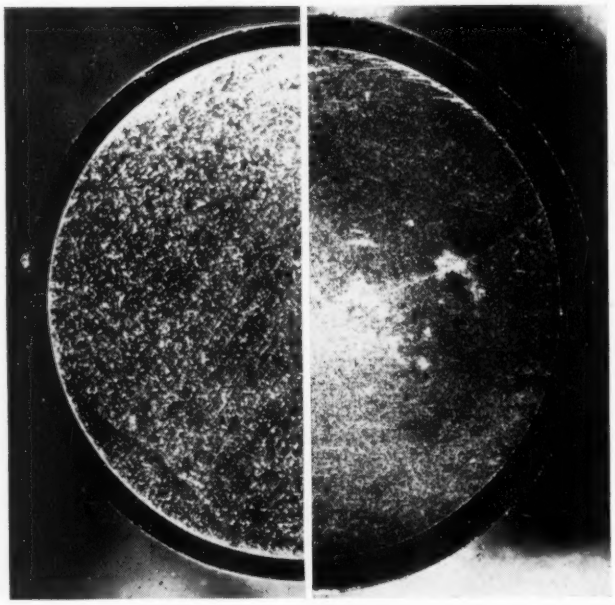
Chromium platers make big gains

More progress reported in plants using Unichrome SRHS® Chromium Plating Solutions



Improved cathode efficiency cuts power need, ups output, saves time. Evidence of higher cathode efficiency of SRHS: Macrograph of steel rod section at left shows 0.016″ of chromium deposited in 16 hours in ordinary solution. Identical rod section at right, plated in SRHS bath under identical conditions, got 0.0225″ deposit — 40% more.

Here's undivided responsibility for good plating results

When Unichrome Bright Nickel was unveiled after more than 3 years of operation, the first complete, *matched* set of plating processes became available—Unichrome Copper, Bright Nickel and SRHS Chromium.

Platers can now *unify* their operation, getting three baths that work outstandingly well together; also undivided responsibility for prompt technical help. Downtime drops. Needless expense can be avoided.

Equally important are the extra opportunities for improving output and cutting production costs through the advantages of the individual processes. For example:

A HELP IN PRODUCTION

Special addition agents for Unichrome Pyrophosphate Copper enable platers to get the deposit to suit their requirements exactly. With one agent, a lustrous deposit is produced which can eliminate buffing. With another, a satin finish is produced which is ideal for buffing — permitting buffing of the free flowing copper rather than the steel or nickel.

With Unichrome Bright Nickel, deposits are obtained that are more receptive to chromium and avoid passivity problems. This stable bath also shows greater tolerance for impurities. To users this has meant reduced downtime for purification.

Send for bulletins on all three processes.

UNITED CHROMIUM, INCORPORATED

100 East 42nd Street, New York 17, N. Y.
Waterbury 20, Conn. • Detroit 20, Mich.
Chicago 4, Ill. • Los Angeles 13, Calif.
In Canada:
United Chromium Limited, Toronto 1, Ont.

The working advantages of SRHS Chromium Solutions show up in different ways. Here are a number of cases to illustrate.

MATERIALS CONSUMPTION CUT

In one automotive plant, the SRHS bath replaced the ordinary chromium solution in a full automatic, resulting in a decrease of salts consumption from 500 pounds down to 300 pounds daily — saving about $3000 a year on salts alone. This saving was due partly to lower dragout loss from the more dilute solution and to diminished spray loss from the more efficient SRHS solution.

POWER CONSUMPTION CUT

At another plant, SRHS halved power consumption. 4-rack loads of bumper guards now get coverage in SRHS with 2500 amperes, whereas this same load needed 5000 amperes in the ordinary chromium solution. Existing power supplies can gain additional work capacity with Unichrome SRHS Solutions, and platers can save on power, too.

PRODUCTION STEPPED UP

Because of the increased plating speed of SRHS Solutions, work took only 2½ hours in one shop, where 3½ hours had previously been needed in the ordinary solution. Taking advantage also of higher efficiency and wider bright plate range, some plants have put through 30 to 66% more work per *cycle* with SRHS.

More information on these and other benefits derived from Unichrome SRHS Solutions can be obtained from the nearest office of United Chromium. ®*Trade Mark*

METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

ESTABLISHED 1903 VOLUME 53 • NUMBER 6 • JUNE, 1955

Forty-Second in Cleveland

The annual convention of the *American Electroplaters' Society*, which will run from June 20 to 23 at the Cleveland Public Auditorium, is the result of a year's effort on the part of almost one hundred committee members, and this alone should insure a completely successful meeting. Some forty technical papers will be presented and discussed, which will probably set a record, and the schedule of social events for the ladies will keep them sufficiently occupied so that no conventioneer need miss any paper of interest to him.

No useful purpose would be served in explaining the advantages to be derived from attending. The exchange of ideas, the broadening of outlook, the meeting of minds — all are reasons which are obvious, even to newcomers to the field who have never before attended these conventions. However, this year is an especially important one because the *Industrial Finishing Exposition* is being held concurrently with the convention and will be conveniently located under the same roof.

Last held in 1952 in Chicago, the 1955 Exposition will be greater than ever before, and will include equipment as large as 44 feet by 12 feet and 10 feet high among the many hundreds of exhibits. The prime purpose will be to inform all those connected with some phase of metal finishing of the latest equipment, techniques, processes and services. Visitors will be able to see developments which they have only read or heard about and will be able to obtain any desired information firsthand. The list of exhibitors is not a cross-section of the industry, it IS the industry and all the technical staffs will be available for enlightenment. The convention program has been arranged so that sufficient time will be allowed to visit and obtain the benefits of an unhurried examination of all the displays.

It will be a few years before an opportunity of this kind will again present itself, which is an important reason for not missing the Convention and Exposition this month. The committees are to be congratulated on a job well done and we know that the attendance will more than meet their expectations. See you in Cleveland.

Nathaniel Hall

A. E. S. TO HOLD 42nd ANNUAL CONVENTION AND FOURTH INDUSTRIAL FINISHING EXPOSITION CLEVELAND, JUNE 20-23

Dr. Ralph A. Schaefer
Supreme President

The American Electroplaters' Society expects to attract about 12,000 production and engineering executives to its *Industrial Finishing Exposition* and *42nd Annual Convention*. This was the estimate made by *Eugene L. Combs*, general chairman of the convention committee.

In addition, Mr. Combs reports exhibitors contracting for space at the exposition are approximately 200. This will be the fourth finishing exposition sponsored by the Society. It was last held in Chicago, in 1952. The 1955 show will occupy approximately 30,000 square feet of exhibit area, featuring finishing equipment, services and supplies.

Both the show and technical sessions are scheduled for the Public Auditorium in Cleveland. By keeping both activities under one roof, industry people attending should be in a position to take full advantage of both exhibits and technical sessions. Two meeting rooms have been arranged in the hall to handle all technical sessions.

Mr. Combs also reports the AES is presenting all technical sessions without charge, for the first time, to anyone attending the exposition. Those in attendance should be able to hear a representative group of discussions on subjects they choose because of morning and afternoon scheduling arrangements. To provide an even better opportunity for show-goers to see exhibits, no technical papers have been scheduled for Wednesday afternoon, June 22nd.

Eugene L. Combs
General Chairman

Papers planned cover subjects in the broad fields of design, construction, engineering, maintenance and operations.

Abstracts of papers will be found on page 80.

The *Metal Finishing Suppliers' Association* will again play an active part in the convention. For details refer to page 82B.

Clyde Kelly
1st Vice-Pres.

Dr. Samuel Heiman
2nd Vice-Pres.

Francis T. Eddy
3rd Vice-Pres.

Dr. George P. Swift
Past President

Peter Kovatis
Exec. Sec'y.

Bert Lupien
Host Branch Pres.

General Program

Sunday, June 19

10:00 a.m.

Executive Secretary's Suite
Hotel Statler

American Electroplaters' Society — Executive Board Meeting.

1:00 p.m.

Mezzanine Floor — Hotel Statler

Registration — The registration desk will be open only until 9:00 p.m.

2:00 p.m.

Hotel Carter

Metal Finishing Suppliers' Association, Inc. — Board of Directors' Meeting.

8:30 p.m.

Ball Room — Hotel Statler

American Electroplaters' Society — "Get Together Party."

Monday, June 20

Exhibit Hours 10:00 a.m.-6:00 p.m.

8:00 a.m.

Parlor "H" — Hotel Hollenden

Speakers' Breakfast.

8:30 a.m.

Music Hall Foyer — Public Auditorium

Registration — St. Clair Avenue entrance. Registration desk open until noon.

9:00 a.m.

North Hall — Public Auditorium

Registration — All day at Lakeside Avenue entrance.

10:00 a.m.

Music Hall — Public Auditorium

Opening Session and Business Meeting.

Invocation: Rev. Frank C. Mesle.
General Chairman: E. L. Combs, Diamond Alkali Co., Cleveland, Ohio.
Business Session: Ralph A. Schaefer, AES President, presiding.

12:30 p.m.

Parlor "H" — Hotel Hollenden

Speakers' Luncheon.

1:30 p.m.

Plant Trips — a. Ferro Corporation; b. Standard Oil Refinery. Make arrangements at Registration Desk, North Hall.

2:00 p.m.

Lower Level — Public Auditorium

First Educational Session — Chairman: M. Caldwell, Dohler Jarvis Co.

6:30 p.m.

Rendezvous Room — Hotel Hollenden

Past Presidents' Dinner.

9:00 p.m.

Rainbow Room — Hotel Carter

Open House — Sponsored by the Metal Finishing Suppliers' Association, Inc. Refreshments and dancing. Buffet served at 10:30 p.m.

Leon Westbrook
Exposition Chairman

Tuesday, June 21

Exhibit Hours 12 noon - 10:00 p.m.

8:00 a.m.

Parlor "H" — Hotel Hollenden

Speakers' Breakfast.

9:00 a.m.

North Hall — Public Auditorium

Registration — All day at Lakeside Avenue entrance.

9:00 a.m.

Ball Room — Hotel Hollenden

Metal Finishing Suppliers' Association, Inc. — Brunch and Meeting.

9:00 a.m.

Parlor "F" — Hotel Hollenden

Midwest Barrel Finishing Association Meeting.

9:30 a.m.

Plant Trip — Euclid Div., General Motors Corp. Make arrangements at Registration Desk, North Hall.

9:30 a.m.

4th Floor Ball Room — Public Auditorium

Second Educational Session — Chairman: B. B. Knapp, International Nickel Co.

12:30 p.m.

Sleepy Hollow Golf Club

Metal Finishing Suppliers' Association, Inc. — Annual golf tournament.

12:30 p.m.

Parlor "H" — Hotel Hollenden

Speakers' Luncheon.

12:30 p.m.

Parlor "B" — Hotel Hollenden

Branch Libraries Luncheon.

1:30 p.m.

Plant Trip — Cleveland Graphite Bronze Co. Make arrangements at Registration Desk, North Hall.

2:00 p.m.

East-West Baseball Game.

2:00 p.m.

Lower Level — Public Auditorium

Third Educational Session — Chairman: John Martin, Enthone, Inc.

Wednesday, June 22

Exhibit Hours 9:30 a.m. - 6:00 p.m.

8:00 a.m.

Parlor "H" — Hotel Hollenden

Speakers' Breakfast.

8:00 a.m.

Hotel Cleveland

Michigan State Alumni Breakfast.

9:00 a.m.

North Hall — Public Auditorium

Registration — All day at Lakeside Avenue entrance.

Mrs. A. R. Hoffman
Pres. Ladies' Aux.

Theodore Pavlish
Convention Sec'y

C. E. A. Solla
Information Chairman

John T. Hyduke
Finance Advisor

Charles F. Ott
Convention Co-Chairman

Joseph Duffy
Golf Chairman

Advisory Committee:—(Seated, Left to Right) C. R. Wheeler, Harvey Heil. (Standing, Left to Right) Harry Pochapsky, L. N. Elicker, S. P. Palisin, and Howard Blouch.

Educational Committee:—(Left to Right) Henry R. Friedberg, Arthur H. DuRose, Co-Chairman; John B. Winters, Chairman; E. J. Roehl, Co-Chairman; Marilyn Sanicky and Robert W. Wild.

Registration Committee:—(Seated, Left to Right) William Acks, Chairman; Gilbert Schaedler, C. A. Cairick, William Radtke, Ralph Everstine. (Standing, Left to Right) George Walton, Jay Becker.

9:30 a.m.

PLANT TRIPS — a. Republic Steel Corp. Strip Mill; b. Lewis Flight Propulsion Lab. Make arrangements at Registration Desk, North Hall.

9:30 a.m.

LOWER LEVEL — PUBLIC AUDITORIUM

FOURTH EDUCATIONAL SESSION (Dual).
Session A (Meeting Room A) — Chairman: Les Morse, Chrysler Corp.
Session B (Meeting Room B) — Chairman: F. Bauch, Frigidaire Div., General Motors Corp.
No afternoon technical sessions scheduled.

12:30 p.m.

PARLOR "B" — HOTEL HOLLENDEN

BRANCH SECRETARIES LUNCHEON.

9:00 p.m.

BALL ROOM — HOTEL STATLER

FLOOR SHOW AND DANCE — American Electroplaters' Society.

Thursday, June 23

EXHIBIT HOURS 9:30 a.m. - 4:00 p.m.

8:00 a.m.

PARLOR "H" — HOTEL HOLLENDEN

SPEAKERS' BREAKFAST.

8:00 a.m.

FLEMISH ROOM — HOTEL HOLLENDEN

AES RESEARCH COMMITTEE BREAKFAST.

9:00 a.m.

NORTH HALL — PUBLIC AUDITORIUM

REGISTRATION — All day at Lakeside Avenue entrance.

9:30 a.m.

PLANT TRIP — Chase Brass and Copper Co. Make arrangements at Registration Desk, North Hall.

9:30 a.m.

LOWER LEVEL — PUBLIC AUDITORIUM

FIFTH EDUCATIONAL SESSION — Chairman: Abner Brenner, U. S. Bureau of Standards.

12:30 p.m.

PARLOR "H" — HOTEL HOLLENDEN

SPEAKERS' LUNCHEON.

1:30 p.m.

PLANT TRIPS — a. Nottingham Filtration Plant; b. Sherwin-Williams Paint Co. Make arrangements at Registration Desk, North Hall.

7:00 p.m.

RAINBOW ROOM — HOTEL CARTER

ANNUAL BANQUET — American Electroplaters' Society.

Technical Program

Monday, June 20

2:00 p.m. Lower Level, Public Auditorium

Chairman: *M. Caldwell*, Dohler Jarvis Co., Div. of National Lead Co.

1. **Plating of Beryllium Coper**
   S. J. Morana, Beryllium Corp.
2. **The Anodic Etch in Preparation for Plating**
   V. L. McEnally and Fred G. Brune, Chrysler Jet Engine Plant
3. **Abrasive Blasting as a Metal Finishing Tool**
   George Barrett, Cleveland Pneumatic Tool Co.; *George Kaufman*, Cleveland Cap Screw Co.; and *William C. Ehlert*, R. W. Renton & Co.
4. **Metal Cleaning Evaluations Using Tagged Soils**
   J. Hensley, Wyandotte Chemicals Corp.

Tuesday, June 21

9:30 a.m. Ball Room, 4th Floor, Public Auditorium

Chairman: *B. B. Knapp*, International Nickel Co.

1. **A Study of Hydrogen Embrittlement in Regards to Electroplating (Includes a color motion picture)**
   Carl Biser, Case Institute of Technology.
2. **Lead-Tin-Antimony Plating**
   R. T. Putnam and *E. J. Roser*, Pratt and Whitney Aircraft Co.
3. **Electroless Nickel Plating of Non-Conductors**
   Philip Eisenberg and *Harold C. Schneider*, Sylvania Electric Products Co.

2:00 p.m. Lower Level, Public Auditorium

Chairman: *John Martin*, Enthone, Inc.

1. **Some Aspects of Solution Level Control**
   J. W. Holland, Loren Stevens, Nello Arterburn (A committee of the AES Indianapolis Branch).
2. **Recovery of Plating Wastes**
   Louis Wersberg and *E. J. Quinlan.*
3. **Filtering Chrome Plating Solutions**
   R. F. Ledford, Industrial Filter and Pump Mfg. Co., and *L. Gilbert*, Rock Island Arsenal.
4. **Report of AES Research Committee**
   Earl J. Serfass.

Plant Visitation Committee:—(Left to Right) Earle J. Esner, William M. King, Chairman; J. H. Hoefer, Co-Chairman; and Henry J. Sedusky.

Entertainment Committee:—(Left to Right) J. T. Bohovic, J. D. Little, Chairman; and Joseph Rhoads.

Banquet Committee:—(From Left to Right) John Hallack, J. C. Tervay, F. H. Bruening, R. A. Wheeler, and A. R. Hoffman.

The Cleveland Terminal Tower, looking North toward the Stadium and Public Auditorium.

Wednesday, June 22

9:30 a.m. Lower Level, Public Auditorium

Session A (Meeting Room A)

Chairman: *Les Morse,* Chrysler Corp.

1. **Electrotinning of Copper Wire from the Stannous Fluoborate Bath**
   A. E. Carlson, General Chemical Div., Allied Chemical & Dye Corp.
2. **Diffused Nickel-Cadmium as a Corrosion Preventive Plate for Jet Engine Parts**
   R. W. Moeller and *W. A. Snell,* Pratt and Whitney Aircraft Co.
3. **The Application of Ultrasonics to Various Plating Systems**
   Stanley R. Rich, Rich-Roth Laboratories.
4. **The Effect of Different Chromium Deposits on the Fatigue Strength of Hardened Steel**
   J. E. Stareck, E. J. Seyb and *A. C. Tulumello,* United Chromium Corp.

Session B (Meeting Room B)

Chairman: *F. Bauch,* Frigidaire Div., General Motors Corp.

1. **Progress Made in Airless Spray Painting**
   James Bede, Bede International Development Co.
2. **The Flow Coatings of Organic Finishes**
   E. A. Zahn, General Electric Co.
3. **Qualities, Processing and Future of Porcelain Enamel and Ceramic Coatings**
   E. E. Bryant, Ferro Corp.
4. **Electrophoretic Deposition of Metallic and Composite Coatings**
   J. J. Shyne, H. N. Barr, W. D. Fletcher and *H. G. Scheible.*

Wednesday afternoon has been set aside for visiting the Industrial Finishing Exposition. No educational sessions are scheduled.

Thursday, June 23

9:30 a.m. Lower Level, Public Auditorium

Chairman: *Abner Brenner,* U. S. Bureau of Standards.

1. **Copper Anode Corrosion in Cyanide and Acid Copper Plating Baths**
   V. H. Safranek and *C. L. Faust,* Battelle Memorial Institute.
2. **Methods of Conduction Classes for Electroplaters**
   Ezra A. Blount, Editor, Products Finishing *Magazine.*
3. **AES Research Project No. 15 — Accelerated Corrosion**
   W. L. Pinner.
4. **AES Research Project No. 12 — Oil Spreading Studies**
   Dr. Henry B. Linford.

Downtown Cleveland looking East on Superior and Euclid Avenues.

Abstracts of Papers

The Plating of Beryllium Copper

By S. J. Morana, *Beryllium Corporation*

This paper covers the silver plating of finished copper parts, cadmium plating of copper mill products and the chromium plating of plastic mold dies. Also included is a discussion of the general feasibility of plating onto beryllium copper, the ease of plating and the durability of the plating itself.

Abrasive Blasting as a Metal Finishing Tool

By George Barrett, *Cleveland Pneumatic Tool Co.,* George Kaufman, *Cleveland Cap Screw Co.* and William C. Ehlert, *R. W. Renton and Co.*

This paper covers the preparation of metal prior to paint or plating and its effect on Tool and Die Life.

The Anodic Etch in Preparation for Plating

By V. L. McEnally and Fred G. Brune, *Chrysler Jet Engine Plant*

The use of a sulfuric acid-epsom salt anodic etch solution in preparation of ferrous parts for plating is discussed. The suc-

cessful application of this process to obtain good adhesion between base metal and the plated coating is considered. A concept is offered to help in understanding the mechanism by which the anodic etch assists in preparation for plating.

Metal Cleaning Evaluations Using Tagged Soils

By J. Hensley, *Wyandotte Chemicals Corp.*

Data are presented illustrating the effects of cleaning variables such as alkali types, concentration, current density, polarity, and cleaning time, with the various soil types. Use is made of carbon 14 as a tagging agent for the various types of soils.

A Study of Hydrogen Embrittlement

By Carl Biser, *Case Institute of Technology*

Part A. — A color motion picture in which caricatures are used to explain the role of hydrogen in embrittling steel.

Part B. — A technical paper dealing with a study of the variables which effect the depth of penetration of hydrogen during cathodic pickling.

Lead-Tin-Antimony Plating

By R. T. Putnam and E. J. Roser, *Pratt & Whitney Aircraft Company*

The proposed paper covers the development of lead-tin-antimony alloy plating as a production process, describing the effect of variations in solution composition and processing conditions such as current density, temperature and agitation.

Filtering Chrome Plating Solutions

By R. F. Ledford, *Industrial Filter & Pump Mfg. Co.* and L. Gilbert, *Rock Island Arsenal.*

This paper will describe a production installation where filtration in chrome plating is used and the methods in which it is used. It will likewise show the effects of some filterable materials in chromium deposits, the material of construction of the equipment, and the performance of the equipment.

Report of AES Research Committee

By Earl J. Serfass

Electrotinning of Copper Wire From the Stannous Fluoborate Bath

By A. E. Carlson, *General Chemical Division, Allied Chemical & Dye Corp.*

A continuous process for tin plating of copper wire, which comprises a number of tanks for cleaning and electroplating at high speeds, has been developed. Heavier size wires may be plated and subsequently drawn and annealed to obtain the finer sizes.

Diffused Nickel-Cadmium as a Corrosion Preventive Plate for Jet Engine Parts

By R. W. Moeller and W. A. Snell, *Pratt & Whitney Aircraft Company.*

The proposed paper is a description of the engineering application of 0.0003" nickel plate plus 0.0001" cadmium diffused at 630 degrees Fahrenheit to provide corrosion protection to intricately shaped low alloy steel parts operating in jet engines at temperatures up to 1000 degrees Fahrenheit. Corrosion data are included as well as production processing experience, in inspection procedures, and precautions of interest to the plater.

Aerial view looking west from Cleveland Terminal Tower, showing Superior and Main Avenue Bridges.

Electroless Nickel Plating of Non-Conductors

By Philip Eisenberg and Harold C. Schneider, *Sylvania Electric Products.*

Electroless nickel was used to plate non-conductors having varied geometry. A description is given of the cleaning and etching cycles, as well as the plating solutions used. Data are presented concerning plate adherence, deposition rates and solution control. Included in the paper are the results of microscopic examination of the plated non-conductors.

Some Aspects of Solution Level Control

By J. W. Holland, Loren Stevens, Nello Arterburn, *A committee of the Indianapolis Branch of the AES.*

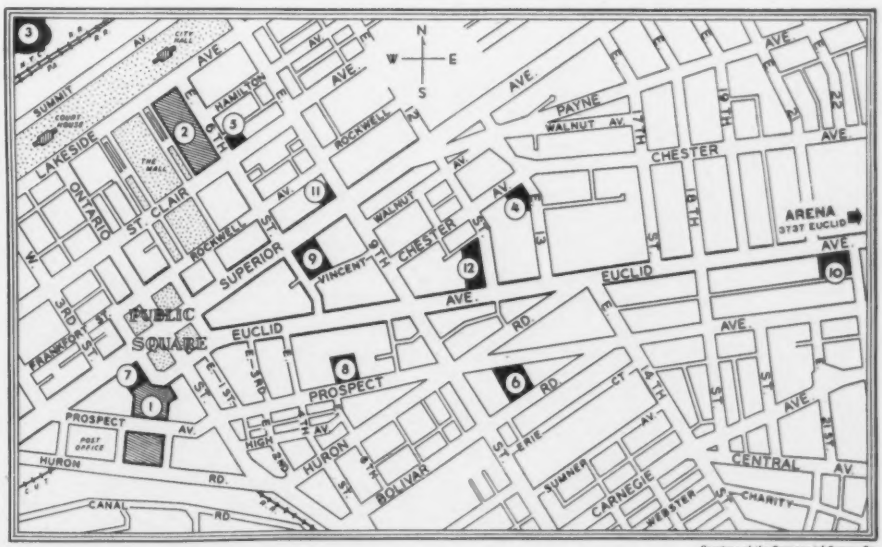
Of all the variables encountered in plating, possibly the most neglected is solution level control. It is the object of this paper to emphasize the many relations of solution level control and to review some of the methods employed to accomplish better control.

Recovery of Plating Wastes

By Louis Weisberg and E. J. Quinlan

This paper describes the layout and opera-

MAP OF DOWNTOWN CLEVELAND



Courtesy of the Commercial Survey Co.

For your convenience, the hotels and Public Auditorium are shown on the above map of downtown Cleveland. Keyed numbers are: (1) Union Station — Terminal Tower; (2) Public Auditorium; (3) Stadium — Home of the "Indians" and the "Browns"; (4) Allerton Hotel; (5) Auditorium Hotel; (6) Carter Hotel; (7) Cleveland Hotel; (8) Colonial Hotel; (9) Hollenden Hotel; (10) New Amsterdam Hotel; (11) Olmsted Hotel; (12) Statler Hotel.

Publicity Committee:—(Seated, Left to Right) J. W. Baker, Chairman; Harry F. Allen (Standing) and Alvin E. Seeley.

Athletic Committee (Seated, Left to Right) John Vanas, Robert Renton, Chairman; George Shepard, Co-Chairman. (Standing, Left to Right) Edward Bolen, Stephen Palisin.

tion of a plant for recovery of wastes from cyanide zinc plating and from a chromate conversion coating operation. Arrangements for segregating wastes according to type and for handling miscellaneous wastes from cleaning and dipping operations are covered. Installation and operating costs are also discussed.

The Application of Ultrasonics to Various Plating Systems

By Stanley R. Rich, *Rich-Roth Laboratories*

A study was carried out in cyanide copper and cyanide cadmium plating baths. This study showed the beneficial effect by greatly reducing anode polarization and increasing the upper limiting current density from 5 to 50 times the normal limiting current density range. This study also was made with various frequencies in the high and low ranges.

The Effect of Different Chromium Deposits of the Fatigue Strength of Hardened Steel

By J. E. Stareck, E. J. Seyb, and A. C. Tulumello, *United Chromium Corporation.*

The fatigue properties of hardened SAE 4140 Steel have been investigated when plated with different types of chromium. The effect of chromium plating on fatigue strength of steel is found to be related to stress in a deposit. The crack pattern, characteristic of electrodeposited chromium, is related to stress and thus indirectly to fatigue in unbaked deposits.

Progress Made in Airless Spray Painting

By James Bede, *Bede International Development Company.*

This is a complete description of the theory and practice of airless spray painting. Many of the early difficulties have now been eliminated and this process eliminates much of the waste and other handicaps inherent with conventional spray methods.

The Flow Coatings of Organic Finishes

By E. A. Zahn, *General Electric Co.*

This manuscript is devoted primarily to further the exploration of the so-called low pressure flow-coat method of paint application for industry. This method, in the opinion of the author, incorporates the best opportunities for the greatest gains in economy and the improvement in the quality of the applied finish.

Qualities, Processing, and Future of Porcelain Enamel and Ceramic Coatings

By E. E. Bryant, *Ferro Corporation*

Porcelain Enamel is a glass and as such must always have some of the characteristics of glass. The outstanding qualities and color possibilities of the surface are a necessity for many purposes. Improvement of processing methods should greatly increase the use of Porcelain Enamel for industrial, construction, and domestic applications where it is not now a necessity.

Electrophoretic Deposition of Metallic and Composite Coatings

By J. J. Shyne, H. N. Barr, W. D. Fletcher, H. G. Scheible.

Electrophoretic deposition is a technique for depositing materials from colloidal dispersions by application of a high D. C. voltage to the electrodes. The variables in the deposition process are voltage, electrode separation, dispersion concentration, and time. The process can be used for the formation of nickel, nickel-chromium and other alloy coatings.

Copper Anode Corrosion in Cyanide and Acid Copper Plating Baths

By V. H. Safranek and C. L. Faust, *Battelle Memorial Institute.*

Copper anodes containing no oxides furnished less sludge in high speed type copper cyanide solution than other cast-copper anodes contaminated with oxides. As a result, smoother copper plate was possible with the oxygen-free anodes. Electrolysis copper forged and rolled anodes were compared with the cast anodes.

Methods of Conducting Classes for Electroplaters

By Ezra A. Blount, *Editor, Products Finishing Magazine.*

This paper will report on electroplating classes currently conducted in private educational institutions and in public school systems, comparing specific courses of study, course outlines, methods and techniques of teaching, development of laboratory experiments, selection of text books and other details.

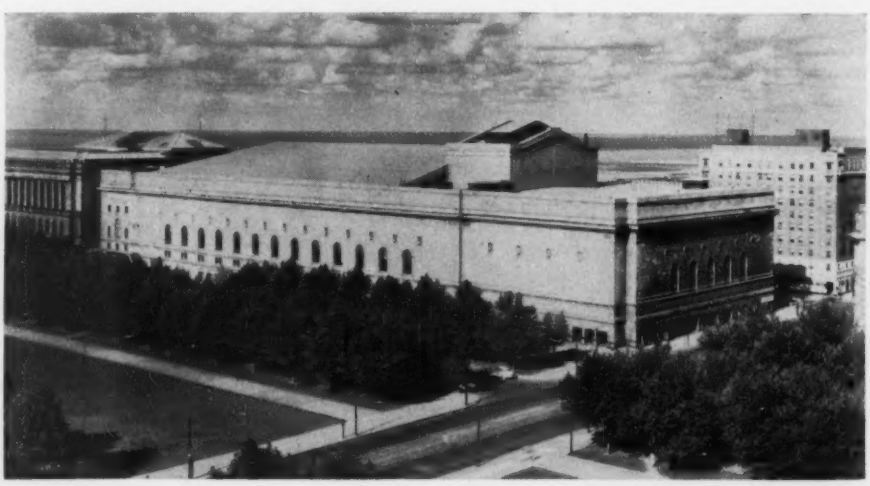
AES Research Project #15 — "Accelerated Corrosion"

By W. L. Pinner

The paper concerns itself with committee action on approximately 20 types of accelerated corrosion tests, on which work has been performed and of which certain promising ones are receiving continuing attention.

AES Research Project #12 — "Oil Spreading Studies"

By Dr. Henry B. Linford



Shown at left is the Cleveland Auditorium which will house the Exposition.

Ladies Program

Ladies' Headquarters will be located in the Hotel Cleveland

Ladies Auxiliary of the American Electroplaters' Society, Cleveland Branch:—(1st Row, Left to Right) Margaret Piovarey, Ann Pavlish, Ann Platt, Frances Hoffman, Rita Shepard, Gwin King, Eleanor Renton. (2nd Row, Left to Right) Veronica Zinn, Irene Solla, Adelaide Ott, Charlotte Sedusky, Dorothy Allen, Marcella Oberg, Louise Pavlish, Margaret Schaefer. (3rd Row, Left to Right) Gertrude Lowe, Lucille Schaefer, Alice Baker, Dorothy Sztul, Ann Boguski, Mary Combs, and Marie Hoefer.

Sunday, June 19

1:00 p.m.

REGISTRATION — HOTEL STATLER

8:30 P.m.

BALLROOM, HOTEL STATLER

GET-TOGETHER PARTY

Monday, June 20

9:00 a.m.

NORTH HALL, PUBLIC AUDITORIUM

REGISTRATION ALL DAY

10:00 a.m.

MUSIC HALL, PUBLIC AUDITORIUM

OPENING SESSION AND BUSINESS MEETING

12:00 noon

ALPINE VILLAGE

LADIES' LUNCHEON AND ENTERTAINMENT

9:00 p.m.

RAINBOW ROOM, HOTEL CARTER

OPEN HOUSE sponsored by Metal Finishing Suppliers' Association. Refreshments and Dancing. Admission by ticket only.

Tuesday, June 21

12:30 p.m.

HIGBEE'S DEPARTMENT STORE AUDITORIUM

"AUNT ELLA" LUNCHEON AND STYLE SHOW Sponsored by Oakite Products, Inc. Host will be Dave Clarin.

Wednesday, June 22

9:00 a.m.

TOUR TO WESTGATE SHOPPING CENTER

12:30 p.m.

LAKESHORE HOTEL

LADIES' LUNCHEON — Sponsored by Udylite Corp. Host: Dr. R. B. Saltonstall.

9:00 p.m.

BALLROOM, HOTEL STATLER

A.E.S. FLOOR SHOW AND DANCE. Admission by ticket only.

Thursday, June 23

10:00 a.m.

BALLROOM, HOTEL CLEVELAND

PLATO PARTY. Joan T. Wiarda will distribute prizes.

12:30 p.m.

BALLROOM, HOTEL CLEVELAND

LUNCHEON. Dorothy Fuldheim, News Analyst, will be speaker.

7:00 p.m.

RAINBOW ROOM, HOTEL CARTER

ANNUAL BANQUET. Admission by reservation ticket.

Dave X. Clarin
(Alias Aunt Ella)

Joan T. Wiarda
(Plato Party Hostess)

Dr. R. B. Saltonstall
(Host at Luncheon)

METAL FINISHING SUPPLIERS ASSOCIATION PROGRAM

Manson Glover
President, Metal Finishing Suppliers Ass'n

Manson Glover Reports

This year, as always, *Metal Finishing Suppliers' Association* is indebted to the Convention Committee for the privilege and pleasure of entertaining its old friends and its new.

MFSA is a growing and increasingly active trade association; but it none the less enjoys the conviction that in one respect it travels in a rut. The tires of its V-8s are trailing the well-greased wheels of the prairie schooners — the old International Fellowship Club, which was founded and sustained to bear conviviality into the technical gatherings of the early AES. It succeeded impressively. If, as we all know, one real asset of AES over other societies of similar aims is the warm friendliness of its get-togethers, the IFC was a factor in this tradition, and MFSA is proud to inherit and carry forward its ideals. It welcomes the Convention in the spirit of its predecessor.

Open House. On Monday evening formal welcome will be extended to all Conventioneers and their families in the lovely terraced ballroom of the Hotel Carter. Your registration-book ticket will admit you to dancing from nine o'clock, a buffet spread at ten-thirty, light beverages for all tastes, and throughout the evening a happy reunion of old-timers and an auspicious introduction for newcomers to AES. The President-Elect of the Association will preside, and holders of the Lucky Numbers will find themselves moderately enriched.

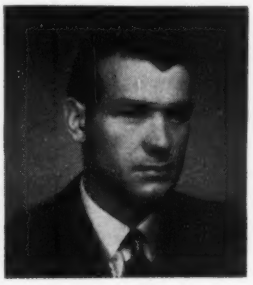
The registration-book ticket is a must, but Cleveland will have available a special registration service so that late arrivals needn't be shut out.

Trustees' Meeting. The regular meeting of the Board of Trustees is called for 2:00 P. M. Sunday, June 19, at the Carter. All chairmen of standing committees and sub-committees are warmly invited. The meeting will set up final agenda for the Annual Meeting of the Association.

MFSA Breakfast and Annual meeting. Exposition hours include Monday afternoon, and Tuesday morning is free. On that account the Annual Meeting of the corporation will be held in connection with a breakfast for all suppliers at the Hollenden, on Tuesday at nine o'clock. The gavel will descend at 9:45 and the agenda will be handled as promptly as possible, both to honor the twelve-o'clock opening hour of the exposition doors and to release for golf (see below) the less responsible of the membership.

Golf Tournament. Vice-President G. Sarazen Duffy informs us that Golf Chairman Bob Renton and his assistant Bob Burford have selected for the MFSA Tournament the Sleepy Hollow Country Club, which lies conveniently for private cars on a freeway directly south of downtown Cleveland. Promptly at one in the afternoon the official starters will launch onto a gracious rolling countryside the first foursome of this tradition-steeped function. Bring your clubs, your shoes, your handicap, and your arithmetic. Skill is desirable but not essential, and the prizes are Really Sump'n — when were they not? Incidentally, Bob Renton is arranging for additional privileges at local courses; see him if you want another game or two.

Herman Struckhoff
1st Vice-Pres.



Joe Duffy
2nd Vice-Pres.

M. M. Beckwith
3rd Vice-Pres.

Tom Trumbour
Treasurer

A. P. Munning
Secretary

Bob Renton
Golf Chairman

Exhibitors

Following is a complete listing of exhibitors of equipment and supplies, together with the booth numbers and the names of persons who will be in attendance at the booths during the Industrial Finishing Exposition.

Acme Manufacturing Company..159-161
1400 East Nine Mile Road, Detroit 20 (Ferndale), Michigan.

George R. Carlson, Glen A. Carlson, Harold Lane, Adam Zimmerman.

Automatic and semi-automatic Polishing, Buffing, Deburring and Micro Finishing Machinery.

Refer to page 22

Allied Research Products, Inc. 238
4004 East Monument Street, Baltimore 5, Maryland.

H. C. Irvin, President; L. C. Kingsbury, Vice-President; C. W. Ostrander, Service Manager; R. Stricklen, Development Engineer; J. A. Cairns, Special Project Manager; A. L. Poe, W. Osborne, L. F. Richard, L. S. Wood, L. C. Camill, H. L. Sennett.

Iridite Finishes for corrosion protection, paint adherence and final finishing of non-ferrous metals; ARP Process Chemicals such as brighteners, addition agents, etc.

Refer to page 113

Almco Division, Queen Stove Works, Inc. 430
505 Front Street, Albert Lea, Minnesota.
R. C. Trow, Vice-President and General Manager; O. D. Ladley, Manager, Eastern Branch; C. Ridgon, Manager, Detroit Branch; John Hapacla, Sales Engineer.

Latest model Barrel Finishing Equipment will be operating and also special demonstrator of the process will be in operation.

Refer to page 38

The American Brass Company 378
414 Meadow Street, Waterbury 20, Connecticut.

W. H. Dowd, Exhibit Manager; Harry M. Paxson, Cleveland District Sales Manager.

"Plus-4" anodes in both sheet and oval forms, and specimens of corroded anodes. There will also be some samples of Formbrite in the display.

Refer to page 136

American Buff Company ....155 & 157
2414 S. La Salle Street, Chicago 16, Illinois.

Ben P. Sax, President; Stanley P. Sax, Vice-President; Harry Pink, Sales Engineer; Marvin Radom, Sales Engineer; Allen Crum, Sales Engineer; Edward Hoyle, Sales Engineer; E. Reichenberg, Sales Engineer; Harry Parsons, Sales Engineer; Murray Paley, Sales Engineer.

Latest buffs on a moving display. Emphasis will be on the exclusive Unit (Finger) Sisal, Open Bias Sisal, and new 200 line Bias Cloth Buffs. Factory representatives will be available to discuss a new process in buffing and will accept parts to be finished by this process.

Refer to pages 18-19

American Platinum Works 484
231 New Jersey Railroad Avenue, Newark 5, New Jersey.

Wm. J. Wagnitz, General Sales Manager; Lawrence Greenspan, Electrochemical Research; Warner Ahlman, Sales.

Fine Silver Anodes in rolled and extruded forms, Silver Salts, Bright Silver plating solutions and samples of plated articles.

Refer to page 30

Analytical Measurements, Inc. 415
585 Main Street, Chatham, New Jersey.
Frank G. Paully, President.

pH testing equipment.

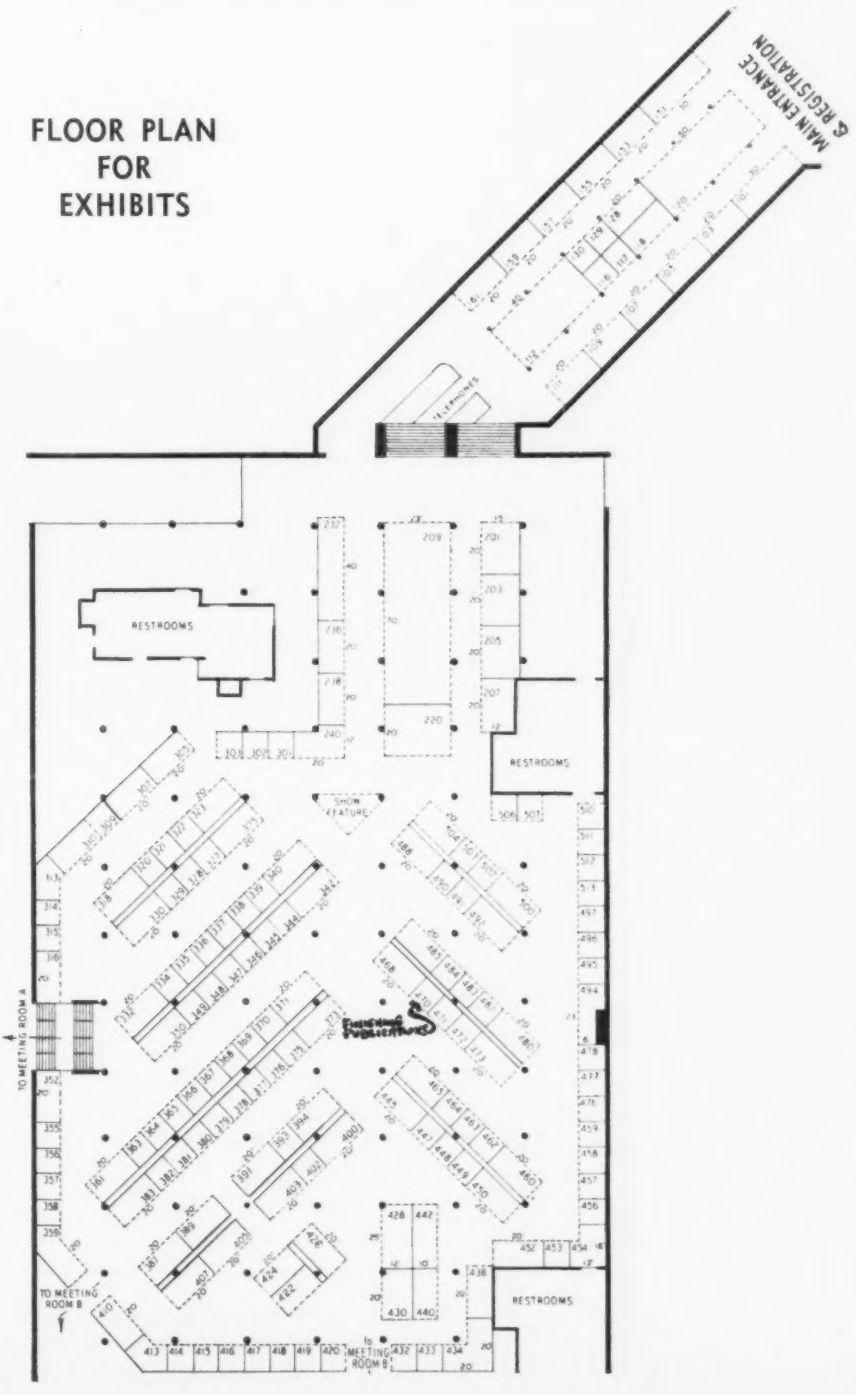
Refer to page 122B

Bacon Felt Company 315
437 W. Water Street, Taunton, Massachusetts.

S. N. McNeilly, Sales Manager; C. Edmund Snook, Sales Engineer; Herbert Holt; George Pabst.

A display of our line of felt products.

Refer to page 70



Bart-Messing Corporation 325
229 Main Street, Belleville 9, New Jersey.
M. M. Messing, President; S. G. Bart, S. Mitwol, E. R. Redlhammer, W. A. Hopkins, W. H. Ross.

Bart-Messing Corp. will show working models of the new Sel-Rex Double Duty filters with both Annular and porous stone elements. Also on display will be the new models of both Sel-Rex Selenium and Germanium rectifiers, and the latest model of the Sel-Rex Jet Plater, a small-volume plating unit.

Refer to page 184

Battelle Metal Fin. Distributors 105
505 King Avenue, Columbus 1, Ohio.

From Battelle: Dr. Charles L. Faust, Chief, Electro-Chemical Div.; W. H. Safranek, Asst. Chief, Electro-Chemical Div.; Richard T. Lasko, Battelle Development Corp.

From Enequist: Dr. Louis Cates.
From Gast: Robert Woodhouse, R. Rosenbach, R. MacKercher.
From Hydrite: L. S. Winter, R. Honkamp.
From Globe Chemical: Malcolm T. Fogg, Technical Service Director; Karl F. Jund, Sales Engineer; John E. Hoover, Chief Chemist.
A demonstration of Electropolishing and Lustralite bronze plating sponsored jointly by the Battelle Development Corp. and their distributors—Globe Chemical Co., Murray Road & Big 4 R.R., Cincinnati 17, Ohio; Enequist Chemical Co., 100 Varick Avenue, Brooklyn 37, New York; P. B. Gast and Sons, 1515 Madison Avenue, S. E., Grand Rapids 7, Michigan; Hydrite Chemical Co., 605 South 12th Street, Milwaukee 4, Wisconsin; Scobell Chemical Co., Inc., Rockwood Avenue, Rochester, New York.

Beacon Supply Company 482
110 Marginal Street, Chelsea 50, Mass.
T. Keating, Sales.
Complete display of all Beacon standard buffing wheels and buffing compounds. Included will be the latest special shaped bar compounds for automatic buffing use. Another feature will be the Tornado, Ventilated, replaceable metal center bias buffing wheel.

Belke Manufacturing Co. 355-356
947 N. Cicero Avenue, Chicago 51. Ill.
William E. Belke, President; Harvie Johnson, Sales.
Plating equipment and supplies.

Refer to pages 27 and 161

Binks Manufacturing Company 369
3120-40 Carroll Avenue, Chicago 12, Illinois.
Karl Osterstrom, Manager, Pump Division; J. Rood, District Regional Manager; Howard Pankratz, Engineer and Salesman; J. Coughlin, Salesman; George Mally, Salesman; John Homan, Salesman; C. E. Fuller, Sales Promotion Manager.
A display board showing spray guns, oil and water extractors, and additional accessory equipment. The complete Binks line of fluid material handling equipment, including pressure tanks, pumps and compressors will be on display. Equipment for liquid buffing compounds and spray finishing equipment will be shown.

G. S. Blakeslee & Co. 410
1844 South Laramie Avenue, Chicago 50, Illinois.

A. L. Bashe, Sales Manager, Chicago, Illinois; Larry Miller, Sales Engineer, Cleveland, Ohio; James Gonyeau, Sales Engineer, Detroit, Michigan; W. C. Thiess, Sales Engineer, Springfield, Ohio; C. D. Underwood, Sales Engineer, Auburn, New York.

Degreasing equipment with information on Blakeslee Metal Parts Washing Machines and "Blacosolv" Degreasing Solvent. Some equipment will be operating.

Refer to page 7

Buckeye Products Company 337
7033 Vine Street, Cincinnati 16, Ohio.
Charles Wise, Secretary; J. Leonard Carroll; Lowell S. Fisher.
Speedie Buffing and Polishing Compositions.

Refer to page 172

Buckingham Products Company 445
14100 Fullerton Avenue, Detroit 27, Michigan.

R. M. Buckingham, President; H. J. Patterson, Salesman; F. X. Woods, Salesman; A. J. Laforet, Sales Dept. (Detroit); Wm. S. Gray, Salesman; Harold E. Gray, Salesman; H. P. Halladay, Salesman; E. G. Goss, Salesman; L. M. Ring, Salesman; Joe Davis, Salesman; R. O. Blackford, Salesman.

Polishing and Buffing Compositions.

Refer to page 117

Chandeysson Electric Co. 465
4074 Bingham Avenue, St. Louis 16, Missouri.

James F. Carland, William E. Schwarz, Ralph P. Morse, Matthew Conway, Kenneth J. Bayer.

A sample generator will be described by an ad-matic machine.

Refer to page 29

The Chemical Corporation 313
54 Waltham Avenue, Springfield 9, Massachusetts.

K. P. Bellinger, Vice-President; B. H. Gardner, Vice- President; P. F. K. Schmidt, Technical Serviceman; H. L. Mitchell, Manager, Laboratory; M. A. Wegenhart, Sales Representative.

Fume disposal exhibit through the use of Pla-Tank chemical resistant reinforced plastic materials; new methods for replenishment of Luster-on conversion coatings to eliminate the disposal of spent material; new Luster-on corrosion-resistant finishes for aluminum.

Refer to pages 54 and 174

Circo Equipment Company 320-321
120 Central Avenue, Clark Township (Rahway), New Jersey.
Melville Morris, President; Vincent L. Wilker, Sales Manager; Ray McDaniel, Sales Engineer; George Grossman, Sales Engineer; Milford Olson, Sales Engineer; Jack Lawson, Sales Engineer.
Vapor Degreasing Equipment and Ultrasonic Cleaning Equipment.

Refer to page 130

Cleveland Process Company 103
1965 East 57th Street, Cleveland 3, Ohio.
Dan Sutton, Sales Manager; F. L. Lefebvre, Sales Dept.; Harry Walter, Sales Dept.; Bun Hiller, Sales Dept.; John Zdelar, Sales Dept.; Frank Yane, Plant Manager.
Clepco Radiant Ovens, Immersion Heaters and Heat Exchangers.

Refer to page 62

Consolidated Vacuum Corp. 464
1775 Mt. Read Blvd., Rochester 3, New York.
A. H. Hartman, Director of Sales and Advertising; D. E. Stocking, Technical Representative; G. C. Waterman, Field Manager; M. B. Gilbert, Technical Representative; D. C. Deyle, Advertising Manager; W. F. Dolke, Resident Sales Manager.
High vacuum metallizing of plastic, metal, and glass materials. A line of laboratory and production units for the deposition of metallic layer of .005" in thickness. Included will be the new 48" model.

Commercial Filters Corp. 383
2 Main Street, Melrose 76, Mass.
"Fulflo" filters fabricated of steel, steel/rubber-lined and stainless steel and replaceable Honeycomb Filter Tubes of cotton, orlon, dynel, nylon and glass fiber for the filtration of plating solutions, water and compressed air.

Cowles Chemical Co. 303
7016 Euclid Avenue, Cleveland 3, Ohio.
E. F. Clark, Robert Finch.
Industrial metal cleaners.

Refer to page 51

Cro-Plate Company 496
747 Windsor, Hartford 5, Connecticut.
R. C. Allen, President.
Wet blasting equipment.

Crown Rheostat & Supply Company 379-380-381
3465 N. Kimball Avenue, Chicago 18, Ill.
Ed Heunerfauth, Fred Green, Charles E. Clindinin.
Plating and related equipment.

Refer to page 11

Curtis Machine Corporation 232
1300 East Second Street, Jamestown, New York.
Gene DeMambro, President; Fred Hopke, Sales Manager; H. Matson, Sales Dept.
Straight-O-Matic, Straight-Line, Pedestal Polishing Lathe, Platen Grinder with serrated contact belt. All machines operated with coated abrasive belts.

Jean Products, Inc. **128**
616 Franklin Avenue, Brooklyn 38, New York.
Walter Raskin, Rubin Raskin, and representatives from other parts of the country.
Thermo-Panels for use in the heating or cooling of solutions for plating, degreasing, metal washing, bonderizing, etc. Available in special shapes such as "U's," "L's," and cylinders, and a range of materials, including iron, stainless steel, monel and other alloys.

Detrex Corporation .....**468 and 485**
Box 501, Roosevelt Park Annex, Detroit 32, Michigan.
A. W. Stoddard, Director of Public Relations & Advertising; W. F. Newbery, Director of Sales; D. E. Williard, Sales Mgr., Ind. Solvents. Div.; L. Camel, Sales Mgr., Chemical Processing Div.; T. J. Kearney, Chief Engr.; P. Moehle, Reg. Mgr.; R. Stribley, Service Mgr., Phosphate Products; W. Webb, Mgr., Spec. Chem. Products; W. Walch, R. Deckelman, W. Mapes, R. Pade, J. Reinhart, and B. Young, Field Representatives.
Operating demonstration of Paint-Bond (Phosphate coating of steel parts) for better paint adherence and prevention of corrosion. Industrial chemicals for cleaning prior to plating, including soak and electrolytic (both anodic and cathodic). Soniclean-Degreasing for quality cleaning of precision parts.

Diamond Alkali Company **307-309**
300 Union Commerce Bldg., Cleveland 14, Ohio.
Eugene L. Coombs, General Convention Chairman; J. S. Cort, Sales Manager, Chrome Div.; W. J. Esselstyn, Sales Mgr. Chlorinated Products Div.; J. P. Branciaroli, Technical Service.
Diamond will not have a working exhibit but will provide a hospitality lounge for all visitors to the Exposition. All products will be featured.
Refer to page 46

The Diversey Corporation **109**
1820 W. Roscoe Street, Chicago 13, Illinois.
M. T. Bennett, Manager, Metal Industries Dept.; J. H. Palmer, Ass't. Mgr., Metal Ind. Dept.; P. H. Newman, Ass't. Mgr. Metal Ind. Dept.; L. C. Hesoun, District Mgr., Metal Ind. Dept.; W. Laletin, District Mgr., Metal Ind. Dept.; W. H. Murphy, District Mgr., Metal Ind. Dept.; C. G. Smith, District Mgr., Metal Ind. Dept.; F. G. Anderson, W. R. Swift, A. Lanning, Jr., L. R. Lindsey, J. B. Rogers, Sales Representatives, Metal Industries Dept.
Our exhibit will highlight four demonstrations:
1. A complete model aluminum etching line set up in six stainless steel tanks will show scale-free aluminum etching using Diversey No. 202, Aluminux and Diversey No. 514.
2. The preparation of aluminum for resistance welding will be demonstrated featuring Diversey No. 36 and No. 514.
3. Demonstration of Diversey No. 909 in a non-caustic, heavy duty all-metal soak.
4. Controlled foam in reverse current cleaning will be exhibited with Diversey No. 12.
In addition to these demonstrations, other compounds for metal finishing and preparation of metals will be displayed.

Dow Chemical Co., Saran Lined Steel Pipe Div. **440**
2415 Burdette Avenue, Ferndale 20, Michigan.
S. H. Blackmore.
Saran lined pipe, fittings, valves, etc.
Refer to pages 32 and 39

Du-Lite Chemical Corporation **377**
River Road, Middletown, Connecticut.
Kenneth Dooley.
Black oxide samples and metal cleaners.
Refer to page 73

E. I. du Pont de Nemours & Co. .....**367 & 368**
Wilmington 98, Delaware.
E. N. Andrews, H. L. Benner, W. R. Cornthwaite, E. C. Friedl, J. J. Hargarten, P. R. Hendrixson, D. W. Hill, J. B. Hitchcock, R. W. Armstrong, L. W. McOmber, A. E. Misfeldt, L. J. Schustik, P. G. Sellger, A. R. Tucker, C. B. Shepherd, A. P. Stetser, H. W. Kennedy, L. C. Leonard, W. J. Zaffke.
Technical and sales representatives of Du Pont's Electrochemicals Department will be on hand at the exhibit to discuss electroplating and vapor degreasing problems with visitors. Literature on Du Pont's products in these fields will be available, particularly the company's new "Triclene" D trichlorethylene solvent for vapor degreasing.
Refer to page 49

Electric Products Company **387**
1725 Clarkstone Road, Cleveland 12, Ohio.
E. G. Schroeder.
Electrolytic motor generators.

Electro-Glo Company **447**
1430 S. Talman Avenue, Chicago 8, Illinois.
J. Jumer, President; L. R. Gallas; J. C. Baker; S. D. Anderson.
Before and after samples of electro-polished pieces. Parts will be of copper alloys, stainless steels, carbon steels and other alloys. Pictorial exhibit of operating procedures and equipment, plus literature and technical bulletins.
Refer to page 173

Electronic Rectifiers, Inc. **322**
2102 Spann Ave., Indianapolis 3, Ind.
Walter Zelinger, Cleveland Representative; Paul B. Freeman, Chief Engineer; Charles R. Ogle, President.
Magnesium Copper Sulphide Dry Contact Rectifiers and Dry Contact Rectifier Power Supplies using Magnesium Copper Sulphide and Selenium Rectifiers and sold under the Trade Mark name of "Lektron." Magnesium Copper Sulphide Rectifiers suitable for use in water cooled applications will also be shown. This is the type used in Resistance Welding Applications of 30,000 amperes and up.
Refer to page 102

Enthone, Inc. **205**
442 Elm St., New Haven, Connecticut.
Dr. Walter R. Meyer, President; C. C. Helmle, Vice-President; H. M. Goldman, Ass't. to Sales Mgr.; J. Rhoads, Engineer; R. Goodsell, Engineer; G. Valentine, Engineer; W. K. Murray, Technical Service Engineer; Derrick Hartshorne, New York Sales.
Display of emulsifiable solvent cleaner in action. Examples of various metal coatings on aluminum, black coatings on various metals, conversion coatings, alkaline deoxidizing, strippers for metal coatings and organic coatings.
Refer to page 3

Federated Metals Div., American Smelting & Refining Co. **348**
120 Broadway, New York 5, New York.
Edgar L. Newhouse, III, General Sales Manager; Sherman M. Goble, Mgr. of Plating & Electrochemicals Dept.; George R. Spotts, Ass't. Mgr. of Plating & Electrochemical Dept.; V. J. Ryan, Ass't. Sales Mgr., Midwestern Dept.; C. B. Murphy, Sales Representative; James Sohl, Sales Representative; Mr. Atiliopsio, Electro Chemical Research.
Anodes, nickel salts, and brighteners for electroplating.
Refer to page 112

Ferro Corporation **463**
4150 East 56th Street, Cleveland 5, Ohio.
Portable measuring device, air operated displacement pump.

Finishing Publications, Inc. **470**
381 Broadway, Westwood, New Jersey.
Thomas A. Trumbour, General Manager; Palmer H. Langdon, Publisher; Joan T. Wiarda, Sales Manager; Nathaniel Hall, Editor METAL FINISHING; *John E. Trumbour, Eastern Manager; Harold P. Preuss, Editor* ORGANIC FINISHING.
Copies of METAL FINISHING and ORGANIC FINISHING will be distributed. A collection of books concerning electroplating and allied subjects will be on display.
A wall chart of handy reference information will be mailed to those who register at our booth.

Formax Mfg. Corporation **359**
3171 Bellevue Ave., Detroit 7, Michigan.
Edward R. McAleer, Bd. Chairman; Howard J. McAleer, President; Edward W. McAleer, Vice-President; Joseph J. McAleer, Vice-President; Richard D. McAleer, Sales Representative; Stuart W. Rodger, Sales Representative; Robert Blake, Sales Representative; James Follas, Sales Representative; Clifford Warner, Sales Representative; John Galloway, Canadian Representative;

Charles Fliger, Sales Dept.; Melvin Dixon, Plant Manager.
Liquid and bar type buffing compounds; "Spray-Max" equipment for liquid buffing compound application; "Zippo" Cloth and Sisal Buffing Wheels; Abrasive belt contact wheels and lubricants; polishing wheel cements; lacquer and enamel rubbing compounds.
Refer to page 139

G. S. Equipment Co. 201
5317 St. Clair Avenue, Cleveland 3, Ohio.
Thomas Gill, President.
Electroplating equipment.
Refer to page 68

General Chemical Div., Allied Chemical & Dye Corp. 153
40 Rector St., New York 6, New York.
J. J. Tomlinson, Mgr. of Advertising; Manager of Sales — B & A, C. P. Berdell; G. T. Stribling, W. H. Witzleben, J. E. Strader, S. I. Rock, R. P. Dames, F. J. Larsen, G. Gargan, W. D. Aust, M. O. Ericson.
Display showing the use of Baker & Adamson Metal Fluoborate Solutions in plating cadmium, copper, iron, lead, nickel and tin. Also to be shown are various other B&A Reagents and Fine Chemicals employed by the plating industry. Technical bulletins which explain the use of fluoborate solutions for special applications (such as plating electrotypes, stereotypes, wire, records, etc.) will be made available.

General Electric Company 117-118
1400 Western Avenue, West Lynn, Massachusetts.
I. A. Lee, Mgr., Rectifier Equipment Sales; J. E. Munganast, J. E. Pimental, J. P. Sydon, Sales Engineers, Rectifier Dept., Lynn; L. M. Jones, Mgr., Product Planning, Rectifier Dept.; P. E. Wood, Rectifier Specialist, Boston Office; H. F. Taylor, Rectifier Specialist, Cleveland Office; E. R. Broughel, Rectifier Specialist, New York Office; N. A. Searles, Rectifier Specialist, Albany, N. Y. Office; W. E. Light, Rectifier Specialist, Philadelphia Office; N. L. Overstreet, Rectifier Specialist, Chicago Office; R. D. Link, Rectifier Specialist, Detroit Office.
Germanium Electroplating or Anodizing unit, plus explanatory and demonstrative material; other plating rectifier equipment.
Refer to pages 16 and 17

The General Ultrasonics Company .476
1240 Main Street, Hartford 3, Connecticut.
Alexander S. Keller, President; Stanley R. Rich, Vice-President; Wilfred Roth, Vice-President. Peter Thorne, Sales Engineer; Harmon Poole, Sales Engineer.
The Soniplate process of accelerated and improved plating by ultrasonic irradiation of the plating bath. Ultrasonic acceleration of acid pickling and descaling will be demonstrated. Ultrasonic cleaning and degreasing in organic solvents, detergents, acids and alkaline solutions will be shown.

Glo-Quartz Electric Heater Co., Inc. 363, 364
37934 Elm Street, Willoughby, Ohio.
George T. Strokes, President, Paul Baker, Plant Engineer; Carl Lindberg, Sales; Jim Longbrake, Dev. Engineer; C. T. Ennis, Secretary; C. M. Bedner, Chief Engineer.
A complete line of electric immersion heaters for heating all solutions. Among the equipment to be displayed are—Translucent and Transparent fused quartz immersion heaters; steel and stainless steel immersion heaters; copper, lead, and impervious graphite immersion heaters; and, a complete line of small laboratory type electric immersion heaters, of quartz and metal sheath. Also on display will be a complete line of heater controls, with some heaters in operation.
Refer to page 66

The Grav-i-Flo Corp. 488, 490, 491
400 Norwood Street, Sturgis, Michigan.
R. L. Davidson, President; L. R. Davidson, Vice-President; Earle Bogema, Chief Engineer; Maurice Condon, Sales & Service Engineer; Eugene Jarvis, Sales & Service Engineer.
A Grav-i-Flo demonstration of Power-Flo mechanical finishing. A 48-2 Grav-i-Flo two compartment tumbling barrel in operation. A motor driven two-deck mechanical separator in operation.

Hammond Machinery Builders, Inc. .....370 & 371
1600 Douglas Avenue, Kalamazoo 54, Michigan.
S. H. Miller, Grinding & Polishing Machinery Mgr.; R. N. Shaw, Mgr. Automatic Finishing Division; D. A. Kilb, District Representative; L. N. Albrecht, District Representative; W. J. Fabish, District Representative.
Automatic Polishing and Buffing Machinery, Polishing and Buffing Lathes, Abrasive Belt Grinders and Polishers, Dust Collectors.
Refer to page 137

Hanson-Van Winkle- Munning Co. .209
Matawan, New Jersey.
Harry F. Allen, Sales Representative; James A. Badaluco, Mgr. Compound Sales; John A. Bauer, Vice-President; C. A. Bridgett, Sales Representative; Charles N. Chalfant, Mgr. of Cleaner Sales; Myron B. Diggin, Technical Director; D. Gardner Foulke, Mgr. of Research; Miss Mildred Gleason, O. S. Tyson & Company, Inc.; Louis M. Hague, President; Edmund H. Hanlon, Sales Office Mgr.; John S. Hart, Field Electrochemist; Roy A. Hoegh, Mercil Plating Equipment Company; P. Ross Lyons, Mgr. of Electrical Sales; Fred W. May, Mgr. of Sales, J. C. Miller Division; Martvig J. Moll, Mgr. of Conveyor Sales; W. Lester Morgan, Senior Finishing Engineer; R. V. Morrison, O. S. Tyson & Co., Inc.; R. M. Norton, Vice-President; C. G. Norton, O. S. Tyson & Company, Inc.; Thomas M. Rodgers, Sales Representative; C. Edward Smith, Mercil Plating Equipment Company; Calvin E. A. Solla, District Manager; Almo D. Squitero, Chief Chemist; Van Winkle Todd, Chairman of the Board; Gustav A. Walgren, Vice-President.
Featured will be a new type full-automatic electroplating and processing conveyor which makes maximum utilization of the "educated hoist" principle. It automatically cycles a series of transfers in moving a multiplicity of racks or plating cylinders through the desired combination of treatments of varying duration. The machine can be adapted to handle either racks or cylinders interchangeably or in combination. This departure from conventional plating equipment promises efficiencies and economies, particularly in smaller scale operations, not previously available.
Another feature will be an island-type display showing most of the supply products manufactured and marketed by H-VW-M for the metal finishing industry. This will enable the visitor to examine at first hand the contruction features of such H-VW-M products as the bonderized Buff-L-Buff and biased sisalweev sections. Associated will be a set-up of the equipment involved in the application of Liquimatic buffing compound, a germanium rectifier, new type plating and burnishing barrels, a dryer of advanced design and numerous panels illustrating H-VW-M processes. As a part of their Nickel-Lume and Level-Lume display, H-VW-M will again use their model elevator-type conveyor, which will automatically Nickel-Lume plate Good Luck spinning coins for distribution to those in attendance.
Refer to pages 125 and 134 A-D

Hardwood Line Mfg. Co. 305
2022 N. California Ave., Chicago 47, Illinois.
Angelo Lazaro, Tim Lazaro.
Portable "Lazo" lucite plating barrels and other electroplating equipment. Six models will be in operation.
Refer to page 145

The Harshaw Chemical Co. 460-462
1945 East 97th Street, Cleveland 6, Ohio.
Chicago: C. O. Meline; Cincinnati: L. J. Howald, A. R. Waters; Cleveland: H. E. Nice, M. M. Beckwith, R. F. Taylor, L. Gianelos, W. P. Karash, A. C. Benning, D. M. Hutchison; Detroit: W. J. McCormick, L. Willick, R. M. Waters; New York: C. F. Robison, C. J. McGuire, E. M. Jones; Philadelphia: E. G. Smith; Pittsburgh: R. J. Goldbach.
Two Harshaw bright nickel plating processes will be shown, the Perglow and Nubrite. The exhibit will emphasize the leveling properties of these solutions.
Refer to pages 14 and 15

Haveg Corporation 314
Newark, Delaware.
Corrosion resistant plastic equipment tanks, pipe, valves, hoods, fans, cement, fume duct.
Refer to page 64

Heatbath Corporation 480
Box 78, Springfield 1, Mass.
Donald R. Barber, General Manager. Ernest A. Walen, Jr., Sales Manager; Daniel J. Clini, Vice-President; Edward Finnie, Plant Superintendent; Marshall

C. Brown, Malcolm A. Focht, William McCrabb, Donald E. Whitten — Sales Representatives.
Black finishes for steel, cast iron, stainless steel, copper, brass, zinc and cadmium; metal cleaning compounds; rust proofing oils; chromate finishes for zinc and cadmium, aluminum bright dip; metal finishing products; heat treating salts; metal strippers; and, organic coatings.

Heil Process Equipment Corp. 373
12901 Elmwood Ave., Cleveland 11, Ohio.
E. W. Vereeke, Exec. Vice-President; H. P. Heil, Vice-President; R. I. Peters, Mgr., Standard Prod. Div.; R. M. Cutter, Mgr. Lining & Coating Div.; B. C. Mulhearn, Mgr. Heilex Prod. Div.; E. G. Huth, Mgr. Metal Fabricating Div.; K. C. Norton, Rigidon Plastic Div.; D. E. Holmgren, Rigidon Plastic Div.; F. W. Arndt, Chief Engineer; R. F. Protiva, Sales Engineer; R. E. Scheel, Sales Engineer (Chicago); P. L. Veit, Sales Engineer (New York).
Exhaust Hoods, Ducts, Stacks, and tank covers manufactured from steel, steel-lined, or solid plastic with either Ridigon or Rigivin. Exhaust fans of steel construction with suitable lining and a new exhaust fan of solid plastic construction. New "Air Saver" system of plating tank ventilation in operation with the air director and the air receiver.
Lined Electroplating Tanks and Heating and Cooling Units: New portable tank for acid handling will be displayed with other lined plating tanks. New solid plastic coil guards will be on display with complete line of "Nocordal" Heating and Cooling Units. Complete line of Lead Anodes for chrome plating. Rigivin, solid plastic pipe and Carbalt used for exterior acid tank protection.
Refer to page 147

R. O. Hull & Company, Inc. 203
1303 Parsons Court, Rocky River 16, Ohio.
R. O. Hull, President; Curtis Miller, Vice-President, Sales; J. L. Jackson, Head, Research and Development; L. A. Critchfield, Technical Representative; Herb Geduld, Technical Representative; W. C. Lang, Technical Representative; R. C. Platt, Technical Representative.
Display of Rohco Test Equipment for plating bath and operation control featuring: Hull Cell Test Set, Hanging Hull Cell, heated and thermostatically control Model WT Hull Cell, solid porcelain Hull Cell, and new Model C2 Currentester, for production rectifier safety-check in operation under simulated production conditions. Operating display of Super "No-Cro-Mist" showing performance of this addition agent for chromium plating baths. Display of results obtainable with Rohco specialty chemicals featuring: 20XL Cadmium Brightener, Zinc Brighteners, including the new and stable Perma-Brite products.
Refer to page 43

Imperial Rack Co., Inc. 240
1613 Industrial Avenue, Flint, Michigan.
Ed Faulman.
"Naraco" products will present the various steps in the manufacture of a common plating rack. Products to be exhibited: Plating racks and fixtures; anodizing racks; "Naraco" removable and replaceable work holders; masking molds; rubber masks; and, "Plastisol" coatings.

Industrial Electroplating Company 407
2325 Valley Avenue, Indianapolis 18, Indiana.
W. G. Niehaus, Vice-President; Carl Niehaus, President.
Niehaus Fume Exhaust Equipment.

Industrial Filter & Pump Mfg. Co. 220
5906 Ogden Avenue, Chicago 50, Illinois.
Ralph E. Liedberg, Vice-President; Ray F. Ledford, Director of Sales & Research; J. C. Hesler, Engineer, Water & Wastes Treatment Division; J. F. Zievers, Export Mgr., Frank Macioce, Ion Exchange Engineer; Mort Van Loon, Field Engr.; Kenneth Johnson, Field Engineer; John Miller, Field Engr.; Al Palermo, Water Treatment Engineer; Stanley Clements, Chief Engineer; Hans Jensen, Mgr. Supt.
A new horizontal Shell Filter (operating model); Dual Chromic Acid Treatment Plant (operating model), destruction and recovery; Lined Centrifugal Pump with section cut out to show construction and new type of mechanical pump seal; Floating Head Heat Exchanger; New Filter aid for Metal Finishing Processes.
Refer to pages 12 and 13

Industrial Finishing Magazine 416
1142 N. Meridian Street, Indianapolis 4, Indiana.
W. H. Rohr, Editor.

Industrial Instruments, Inc. 414
89 Commerce Road, Cedar Grove, N. J.
An automatic rinse tanks controller.
Refer to page 10

The International Nickel Co., Inc. 330
67 Wall Street, New York 5, New York.
W. Borner, Research Chemist; J. W. Carey, Ass't. Section Head; W. R. Ferguson, Shows and Exhibits; B. Knapp, Research Chemist; W. Prine, Section Head, Plating Section Nickel Sales; C. Sample, Section Head, Plating Section D & R; W. W. Sellers, Section Head, Plating Section Research Lab.
Background will be made up of charts indicating the relative importance of nickel consumption in the plating industry as compared to free world production of nickel and total nickel consumed in the United States. There will also be photographs illustrating the research facilities of The International Nickel Company's Bayonne Research Laboratory.
Refer to page 163

International Rustproof Corp. 512
12507 Plover Avenue, Cleveland 7, Ohio.
Howard Pikar, Bud Murton, Jack Hendricks, Bert Palm.
Surface treatment products and their application.
Refer to page 170

Kocour Company 442
4802 S. St. Louis Avenue, Chicago 32, Illinois.
Orville Kocour, Sales Manager; Edward F. Jablonski, Advertising Manager; Everett A. Hodges, Laboratory Director; Walter Warner, Sales Representative; Norman K. Meyers, Sales Rep. Michigan; Robert L. Onkey, President, Roberts Rouge Co.; Mike Tamas, Sales Rep. Roberts Rouge Co.
Kocour Test Sets for the analytical control of plating, cleaning, pickling and anodizing solutions, and metal identification; pH Meters and pH comparators; thickness testing — magnetic method, dropping method, and the anodic solution method; Kocour buffing and polishing compositions and Robert's Greaseless Compounds. Special features will be the continuous operation of the Kocour Automatic Dropping Unit, and demonstrations of the Kocour electronic thickness tester, Kocour Metal Identification Set, and buffing silver plate with Robert's Greaseless Compounds.
Refer to page 61

Kraft Chemical Co. 358
917 West 18th Street, Chicago 8, Illinois.
G. G. Kraft, Carmine Carr, Desmond Castain.
Safety CyaNodes, a half ounce potassium cyanide cast cylinder and other plating chemicals.
Refer to page 164

Lansing Industrial Sales Co. 511
2301 W. Main St., Lansing 15, Mich.
S. E. Race, Vice-President; Phil Moran, Salesman.
A one-quarter size model, made of aluminum of the "Lisco" Drum Mixer. This model will be operated by hand instead of motor. Also on display will be samples of casters and rubber wheels.

Lasalco, Inc. 342
2820 LaSalle Street, St. Louis 4, Missouri.
Herman Struckhoff, President.
Electroplating equipment and supplies.
Refer to page 59

Lea Mfg. Company 473
16 Cherry Avenue, Waterbury 20, Connecticut.
Earle W. Couch, President; Richard P. Crane, Vice-President & Sales Manager; Dr. H. L. Kellner, Technical Director; Ellsworth T. Candee, Director of Research; Dee F. Mosher, Vice-President of Lea-Michigan, Inc.; John R. Guss, Metal Finishing Engineer; S. Lewis Doughty, Electrochemical Engineer; Francis X. Bergin, Metal Finishing Engineer; Leo J. Bakinow, Sales Promotion Manager.
A conference type exhibit of the latest practical, production proven developments, methods and techniques in abrasive and electrochemical surface finishing. Finishing engineers will be in attendance to discuss automation in abrasive finishing compositions and methods, bright high speed copper, nickel, cadmium, silver, and gold plating processes, and related specialties and equipment.
Refer to page 106A

Lea-Ronal, Inc. **472**
42-48 27th Street, Long Island City 1, New York.
Barnet D. Ostrow, General Mgr.; Fred I. Nobel, Technical Director; Dan Glassman, Sales.
Lea-Ronal High Speed Bright Cyanide Copper Process produces a soft brilliant ductile deposit.
Lea-Ronal High Speed Bright Silver Process produces brilliant deposits for both decorative and industrial uses.
Also, displays of these processes will be shown as well as the Lea-Ronal Bright Nickel, Bright Gold "S" and "SA" which are room temperature processes, and the Lea-Ronal Bright Acid Copper Bath. Other products included will be Supertartral addition agent for Cyanide Copper Baths and the Ronal EZ-Kleen Filter.
Refer to page 106B

Lord Chemical Corporation **405**
2068 S. Queen Street, York, Pennsylvania.
H. R. Stitely.
Tumbling barrels, compounds media, "before and after" samples.

Man-Gill Chemical Co. **393**
2338 Canal Road, Cleveland 13, Ohio.
V. M. Gilliam.
Industrial metal cleaners and chemicals.

The Martindale Electric Co. **447**
1353 Hird Avenue, Cleveland 7, Ohio.
E. H. Martindale, President; Wm. N. Osbun, Secretary; John Fenton, Sales Engineer; R. H. Martindale, Vice-President, Carl Rueter, Sales Engineer, Roy E. Blersch, Tool Spec.
Plating Generator Commutator Grinding Tools, Undercrutters, Ammeter Tong Test DC & AC for checking anodes, General Equipment for electric motor maintenance, Martindale Dust Masks.

McAleer Manufacturing Corp.....**365-366**
101 S. Waterman Avenue, Detroit 17, Michigan.
C. H. McAleer, President; Edward Van Zandt, Sales Manager; Tom Tomezak, Sales Representative; Harry Anderson Sales Representative.
Polishing and buffing compounds, buffs and polishing wheels. Also electroplated products such as stainless steel wheel discs; die castings, etc., will be on display.
Refer to page 26

McGean Chemical Co. **422-424**
1040 Midland Bldg., Cleveland 15, Ohio.
R. L. McGean, Vice-President; P. M. Savage, Secretary; V. H. Waite, Director of Research; S. B. Cowdery; J. D. Little; E. A. Perry; J. J. Becker; Ben Martin.
Displays of anodes and chemicals and commercial parts plated through the use of McGean Bright Nickel Processes. Such parts will indicate extensive use by large automobile and automotive parts producers plus other fields of electroplating such as electrical appliances and metal furniture.
Refer to page 21

Metal & Thermit Corporation **332**
100 East 42nd Street, New York 17, New York.
H. Buchanan, Sales Manager Chemicals Division, New York; F. Haas, Sales Engineer; J. Bouchoux, Sales Engineer; E. Tinnon, Sales Engineer; B. Brooks, Sales Engineer; R. Gore, Technical Service; S. Fistas, Technical Service.
Tin-Nickel Plating demonstration and also samples finished in bronze plate, tin-zinc plate, tin plate, continuous wire plating using Metal & Thermit products.

Michigan Buff Co., Inc. **334-335**
3503 Gaylord Avenue, Detroit 12, Michigan.
A. N. Payson, President; O. J. Horsch, Manager; Dennis Durbin, Ohio Sales Manager; C. G. Dinallo, New York Sales Manager; A. J. Becker, Jr., Sales; Raymond Parker, Sales.
Buffs, Polishing Wheels and Finishing Supplies.
Refer to page 180

Michigan Chrome & Chemical Co...**349**
8615 Grinnell Avenue, Detroit 13, Mich.
King Ruhly, Sales Manager; Frank Jones, Ass't. Sales Mgr.; Allen Russell, Sales Representative; Don Patterson, Sales Representative.
Micro Products — Stop-Off Materials, Micrososol, Rack Coatings, Maintenance Paint, Micrrotape.
Refer to page 55

Midwest Barrel Finishing Assn......**452**

Minnesota Mining & Mfg. Co. **452**
Honite Division
900 Fauquier Avenue, St. Paul 6, Minn.
Refer to page 71

Mitchell-Bradford Chemical Company .....**344 and 345**
Wampus Lane, Milford, Connecticut.
A. J. Mitchell, President; G. A. Frick, Vice-President; R. J. McComb, General Sales Manager; E. J. Butler, Sales Engineer; J. T. Ott, Sales Engineer; R. J. Rohr, Sales Engineer; A. C. Cowal, Sales Engineer; J. Bizzarro, Sales Engineer; C. D. Hamilton, Sales Engineer; D. P. Strauss, Sales Engineer.
Displays of items furnished in Black Magic blackening processes for ferrous and non-ferrous metals. Available literature on the above processes, also metal cleaners, Rust preventives, plating specialties, tanks, controls, and heat treating salts.
Refer to page 58

Munning & Munning, Inc. **382**
202-208 Emmet Street, Newark 5, New Jersey.
A. P. Munning, J. A. Munning, L. W. Reinken, W. J. Winward, W. W. McCord.
Rectifiers (Munning-Green) and newer type multiple tumbling units. There will also be some plating appliances.

New Holland Machine Division, Sperry Corp. **420**
New Holland, Pa.
George Turner, George Healey.
New Holland Kreider centrifugal dryer for plated work and small lacquered parts. Available with auxiliary steam or gas heating units.

National Carbon Company **391**
30 East 42nd Street, New York 17, New York.
C. E. Ford, Mgr. Chemical Products Sales; W. W. Palmquist, Sales Promotion; J. F. Brauning, Sales; M. A. Miranda, Sales; J. A. Mraz, Sales.
New "Karbate" Impervious Graphite, Circulation Heat-Exchange Systems, All Corrosive for Plating Solutions.

Nobles Engineering & Mfg. Co. **336**
645 East 7th Street, St. Paul 6, Minnesota.
Centrifugal dryer and accessories.
Refer page 116

Oakite Products, Inc. **426**
14 Rector Street, New York 6, New York.
D. X. Clarin, Mgr., New York & Metropolitan Division; G. A. Lux, Director of Technical Education; F. E. Bruening, Mgr., Cleveland Division; R. B. Potter, A. H. Horst, J. C. Tervay, W. R. Peate, M. R. Stevens, Technical Service Representatives; W. L. Russell, R. Crane, M. L. Hahn, M. B. McClain.
Phosphating, electrocleaning, burnishing, rust removing and preventing, descaling compounds; paint strippers; water treatment chemicals for paint spray booths.
Refer to page 4

Patent Button Company, Patwin Instruments Div. **376**
41 Brown Street, Waterbury 20, Connecticut.
A. D. Cronk, Mgr. Market Research; George Tatorian, Research Engineer; Frank Tirendi, Finishing Foreman.
Polaragraphic equipment, flame photometer. Model C-1 Electro-Polarization.

Pennsylvania Salt Mfg. Co. **352**
1012 Widener Bldg., Philadelphia 7, Pennsylvania.
A. H. Pope, Prod. Supervisor for Pennsalt Cleaners; R. M. Burford, District Mgr., Metal Processing Dept.; J. J. Keers, J. O. Cram, Sales-Service Representatives; W. D. West, Technical Dept.; J. J. Duffy.
Special electroplating cycles including new Pennsalt Cleaners. Also, a minature automatic finishing machine will be in operation demonstrating an aluminum etching and anodizing cycle employing Pennsalt materials.
Refer to pages 110 and 111

Phillips Mfg. Co. **449**
3496 W. Touhy Ave., Chicago 45, Ill.
H. J. Beierwaltes, Sales Manager.
Degreasing machinery and solvents.

Platers Research Corporation **347**
59 East Fourth Street, New York 3, New York.
S. C. Taormina, President; A. T. Marinaro, Technical Director; L. Packman, Service Engineer; C. Geldzahler, Technical Director, Platers Technical Service, Inc., Chicago, Illinois.
"Nickelite" Barrel Brightener for Nickel; "Pocket Handi-Gage" Magnetic Thickness Tester.
Refer to pages 161 and 166

Plating Magazine .....**North Hall**
145 Broad Street, Newark 2, New Jersey.
Archimedes Doria, Editor.

Products Finishing Magazine **361**
431 Main Street, Cincinnati 2, Ohio.
Ezra A. Blount, Editor.

Promat Division, Poor & Company ..**488, 490, 491, 492, 500, 502, 503 and 504**
851 South Market Street, Waukegan, Illinois.
Frank Hartwig, Service Engineer; Claude Weekly, Service Manager; Harold A. Kahler, Ass't. to Vice-President.
Protective finishes on a give-away item which will be processed "dry" through equipment exhibited by Wagner Bros. and Grav-i-Flo Corp. Processing tanks will show Promat materials used. Technical bulletins explaining processing procedure will be available.
Refer to page 129

Production Machine Co. **428**
Greenfield, Massachusetts.
A display and demonstration of centerless polishing and buffing machines for tubing and bar stock. Machines using buffing wheels and felt belts with compositions applied.

Ramco Equip. Corp., Div. of Randall Mfg. Co., Inc. **433**
1373 Lafayette Ave., New York 59, New York.
Max Randall, President; Martin Randall, Sec'y-Treas.; J. H. Carleton, J. C. Baker, Distributor; J. C. Baker, J. C. Baker Distributor.
Demonstration of "Ultra-Sonic" vapor degreasing plus various models of vapor degreasing equipment.
Refer to page 48

Rampe Manufacturing Co. **301**
14915 Woodworth Avenue, Cleveland 10, Ohio.
John F. Rampe, President; W. Charles Rampe, Vice-President.
Several models of tumbling equipment will be in operation with literature on the entire line available.
Refer to page 52

Rapid Electric Co. **323**
2881 Middletown Road, Bronx 61, New York.
James A. Viola, President, Wm. E. Bryan, Director of Sales; Matt Lovrich, Test Engineer; Robert Tedeschi, Adv. Dept.; George Viola, Treasurer.
DC Power Supplies, Germanium Rectifiers, Selenium Rectifiers, Periodic Reversers, Transformers, Shunts, and miscellaneous electrical components.
Refer to page 9

R. W. Renton & Co. **350**
877 Addison Road, Cleveland 3, Ohio.
R. W. Renton, President.
Jet blast liquid honing equipment, plating racks, buffing compositions, lined process tanks.

Roto-Finish Co. **394**
3706 Milham Road, Kalamazoo, Mich.
Donald T. Barrett, President; C. Heamon Castle, Vice-President & Technical Director; John W. Servaas, Vice-President & Secretary; Roy T. Romine, Chief Engineer; Factory Representatives — Wallace L. Reed, Louis W. Evans, Paul W. Sheppard, John Hatfield, Robert E. Cook, Richard D. Taylor, Richard M. McDowell.
Roto-Finish tumbling machine, parts and parts display.
Refer to page 143

Schaffner Mfg. Co. and Schaffner Buff Co. **310**
Schaffner Center, Emsworth, Pittsburgh 2, Pennsylvania.
Paul E. Schaffner, President; Robert D. Schaffner, Vice-President, Gus J. Schaffner, Jr., Chairman of Board; Samuel A. Zeitman, Chemist; James R. Schaffner, Sales; Robert E. H. Henry, Sales; W. A. Nelson, Sales; Donald R. Yokel, Sales.
Buffing Compositions, Buffs, Anodes, Grease Stick, Grip Grain, and Patented No-Nubbin Buffing Compound.
Refer to page 169

Sel-Rex Precious Metals, Inc. **325**
229 Main Street, Belleville 9, New Jersey.
M. M. Messing, President; E. C. Rinker, Technical Director; A. Korbelak, Sales Manager; Wm. Ross, Vice-President; R. N. Griffin.
A display of precious metal plating, including gold, silver and rhodium. Samples plated with the newest Sel-Rex alloy gold plating process.
Refer to Inside Back Cover

The J. J. Siefen Co. **346**
5643 Lauderdale, Detroit 9, Michigan.
J. F. Siefen, President; C. A. DeGroat, Sales Manager; E. A. Brisson, Sales Engr.; A. Darnell, Sales Engr.; C. Elliott, Sales Engr.; V. McBride, Sales Engr.; J. Johnson, Sales Engr.; E. A. Smith, Sales Engr.
Spray equipment for Buffing Compounds.
Refer to page 160

Smoothex Incorporated **483**
10705 Briggs Road, Cleveland 11, Ohio.
Lloyd B. Portzer, President; W. C. Leitenberger, Sec'y & Treas.; W. M. Radtke, Eastern Sales Mgr.; Max Fraze, Western Sales Manager; Al Konrad, Chief Chemist.
Plated ware on display boards.
Refer to page 56

South Florida Test Service **328**
4201 N. W. 7th Street, Miami 34, Florida.
Earl M. DeNoon, Owner & Technical Director; Warren W. Smith, Chemical Engineer.
Photographic display of test facilities and varied locations in Southeastern Florida, and actual test specimens and assemblies on exposure. Photographs depict ways in which the Finishing Industry can be benefited by actual exposure testing.
Refer to page 177

Solventol Chemical Products, Inc.....**375**
15841 2nd Blvd., Detroit 3, Michigan.
H. G. Downs, Sales.
Industrial and metal cleaning compounds.

Sparkler Manufacturing Co. **506**
169 N. Lake Street, Mundelein, Illinois.
H. N. Haberstroh, Sales Representative; W. C. Buettgen, Sales Representative; R. E. Shields, Assistant Sales Mgr.
Model 8-18 Sparkler Horizontal Plate Filter, in all rubber lined construction, composition C-17 plates, Panelyte screens, complete with pump and motor equipment, and mounted on portable base. Model VR-17-12 Sparkler Dual-Disc Filter, in all iron construction, with pump and motor equipment, and mounted on portable base.
Refer to page 109

Spee-Flo Corporation **357**
720 Polk, Houston, Texas.
G. S. Levey, President; Stan Harvey, Production Manager; Larry E. Crosswhite, Promotion Manager; Houston, T. C. English, Representative, Cleveland.
New all-electric Circaflo hot spray heater. Equipped with ¼ hp. electric motor and centrifugal pump, these units are rated at 15 GHP, with hose lengths up to 50 feet. The Circaflo 600 provides automatic viscosity and temperature control of conventional paint materials. The complete line of Spee-Flo hot spray heaters will be on display including the Powermastic heaters for heavy viscosity materials. Also featured are the special units designed for plant maintenance or other portable uses.

The Standard Electrical Tool Co. ..**450**
2903 River Road, Cincinnati 4, Ohio.
W. A. Ferguson, President; R. C. Dalton, Sales Manager; V. R. Lagaly, Sales Engineer; R. J. Ferguson, Ohio District Sales Engr.; W. J. Holtmeier, Eastern Sales Engineer; A. J. Floor, Upper New York Sales Mgr.; D. K. Calhoun, Midwest Sales Engineer.
Type RV Infinitely Variable Speed Buffing and Polishing Lathe, Speed Chucking Lathe, 1 HP bench and pedestal model Infinitely Variable Speed Buffing and Polishing Lathe; Four bearing direct drive, pedestal model, buffing and polishing lathe; Type BDM Automatic Brushing Lathe.

Standard Plating Rack Co. **318**
1925 N. Paulina Street, Chicago 22, Illinois.
Max S. Schneider, President.
Plating racks and masking devices for the selective plating of parts.
Refer to page 44

Frederic B. Stevens, Inc. **112**
1800 18th Street, Detroit 16, Michigan.
A. B. Hoefer, Vice-President; Frank Watt, General Sales Manager; Guy Cummings, Mgr. of Plating Supply & Equipment Sales; D. J. Swaninger, Mgr. of Buffing Composition Sales; Carl B. Anderson, Sales Promotion & Advertising Manager; Harry Brown, District Sales Manager (Central States); Geo. Stevenson, Byron Jacoby, Tom Williams — Sales Engineers.
Built around Frederic B. Stevens, Inc. newest engineering development, the

"Little Steve" Automatic Plating and Processing Machine. This is a small automatic with a big capacity for its size, designed for job shop or plating department work where larger automatic machines are not feasible. The latest engineering data and an exhibit covering the new Stevens "Stevadoer" Heavy-Duty Plating and Processing Machine, the Stevens Automatic Barrel Plating and Processing Machine and auxiliary equipment in connection with the electroplating industry.

Refer to pages 114 and 115

F. J. Stokes Machine Company 316
5500 Tabor Road, Philadelphia 20, Pennsylvania.
J. Gordon Seiter, Manager, High-Vacuum Division; Joseph Piotrowski, Product Specialist, Vacuum Metallizing; Malcolm S. Adler, Manager, Cleveland District Office; Robert Krause, Sales Engineer, Cleveland District Office; David E. Stokes, Manager, Market Development; Jay Steiner, Advertising Manager.
A 24" diameter Stokes Model 425 vacuum plater will be in operation plating metal parts. The new 36" diameter Stokes Model 428 vacuum plater, including dolly, carriage and spiders will be on display.

Refer to page 34

Swift Industrial Chemical Co. 432
Albany Turnpike, Rt. 44, Canton, Connecticut.
John A. Swift, President and Technical Director; Vernon H. Dunbar, Technical Sales Manager; Norman M. Howe, Technical Sales Representative; J. C. Baker, Owner Baker Distributing Co., Cleveland Distributor; James H. Carlton, Salesman, Baker Distributing Co., Cleveland.
Stainless steel, nickel and silicon steel, and cast iron products blackened by Swift Nu-Black Process. Exhibit of tungsten and molybdenum high speed steels blackened by Nu-Black. Products plated and processed in electroplating baths employing Swift compounds and additives.
Rust Resisting Compounds and Finishes, Cleaning Compounds, Electroplating and Bright Dipping Compounds, Acid additives, Stripping Compounds.

Refer to page 174

Technic, Inc. 457
39 Snow Street, Providence 3, Rhode Island.
F. K. Smith, President; Dr. Edward A. Parker.
Gold and rhodium plated material.

Refer to page 126

Ther Electric & Machine Works 129
19 S. Jefferson Street, Chicago 6, Illinois.
E. R. Ther, Manager; C. F. Norcross, Sales Manager; P. H. Watt, Sales Engineer.
Exhibiting line of Ther electroplating and anodizing rectifiers.

Refer to page 149

H. O. Trerice Co. 302
1420 W. Lafayette Blvd., Detroit 16, Michigan.
J. L. Brackett, Sales Manager.
Temperature and pressure instruments.

Tumbling Sales & Service Co. 389
King Street, Greenwich, Connecticut.
Morris S. Shipley, President; William Biebel, Vice-President; Clifford Carten, Production Manager.
Esbec Barrel Finishing Equipment and supplies. Bench twin, super twin and heavy duty model, roller separator, chip storage bin.

Turco Products, Inc. 107
P. O. Box 2649, Terminal Annex, Los Angeles 1, Calif.
Cleaning materials.

The Udylite Corp. 120, 101, 151
1651 E. Grand Blvd., Detroit 11, Mich.
R. C. Trees, Dr. R. B. Saltonstall, A. J. Lupien, Arthur Gerada, Vincent Kelly, Joseph Hoefer, Richard Scott, William Jackson, Edward Hoover.
A fully automatic plating barrel machine will be in operation (dry). A new Germanium rectifier and a selenium rectifier will be shown as well as displays of proprietary processes and supplies for all kinds of metal finishing. MacDermid Cleaners — Zero Mist.

Refer to pages 120 and 121

Unit Process Assemblies, Inc. 347
75 East Fourth Street, New York 3, New York.
S. Lieber, President.
Periodic-Reverse Plating Units, Automatic Rheostat ("Automatic Plating Controller"). Announcing New Non-Destructive Electronic Thickness Gage for plating thicknesses on magnetic and non-magnetic base metals.

Refer to page 176

United Chromium, Inc. ..338, 339, 340
100 East 42nd Street, New York 17, New York.
R. O. Loengard, President; H. D. McLeese, Vice-President; T. G. Coyle, Vice-President; H. Mahlstedt, Sales Manager, Electroplating Division; J. E. Stareck, Director of Research; R. H. Dudley, District Sales Manager; E. N. Riotte, District Sales Manager; C. W. Carter, District Sales Manager; W. S. Cibulskis, Chief of Engineering; I. M. Weiss, Sales and Service Engineer.
Various metal finishes produced with plating processes, plating equipment, organic coatings materials and conversion coating materials developed by United Chromium, Incorporated. Included will be items finished with Unichrome Pyrophosphate Copper, Bright Nickel, SRHS Chromium, Self-Reguating Crack-Free Chromium, and Dips for Chromate Treating Zinc and Cadmium, Stop-Off Lacquers and Compounds, Ucilon Protective Coatings, Unichrome Lacquers, Enamels and Synthetics, and Primers, and the first practical sprayable plastisol Unichrome Coating 5300. A portion of the exhibit will also be devoted to plating equipment now being supplied by United Chromium.

Refer to pages 74 and 150 to 157

U. S. Stoneware Co. 111
Akron 9, Ohio.
Howard Farkas, Vice-President; G. W. Fine, Ass't. Sales Manager; W. B. Carrell, Ass't. Sales Manager; Sidney Lewis, Ass't. Sales Manager; Kenneth Bullock, Ass't. Sales Mgr.; Ralph Gross, Advertising Manager.
Tygon "ATD" Hot Spray vinyl protective coatings, rack coatings, acid-proof brick floors, Tygon-lined plating tanks.

Refer to page 131

Univertical Foundry & Machine Co..471
14841 Meyers, Detroit 27, Michigan.
Charles T. Walker, General Manager; Mrs. Marie Feeney, Secretary; James McCann, Salesman; Larry E. Glynn, Salesman.
Various types of anodes.

Refer to page 122B

Wagner Brothers, Inc. ..488, 490, 491, 492, 500, 502, 503, 504
400 Midland, Detroit 3, Mich.
J. R. Wagner, President; F. W. Wagner, S. M.; O. H. Tiedeman; F. Lisowski; F. Haney; J. Lisowski; W. Thompson.
Wagner Brothers Full Automatic Plating Machine, Filter, Electroplating Rectifier. Grav-i-Flo tumbling machine and Grav-i-Flo mechanical separator.

Refer to pages 10A-10D and 174

Wallace & Tiernan Co., Inc. 329
25 Main Street, Belleville 9, New Jersey.
J. M. Van Gelder, C. W. Brandell, M. I. Keirn, H. B. Snyder.
Chlorination equipment for Industrial Sewage and Waste Treatment.

Refer to page 28

White-Roth Machine Corporation 405
1936 West 19th Street, Lorain, Ohio.
Tumbling barrels and materials.

Edwin L. Wiegand Co. 400
7505 Thomas Blvd.; Pittsburgh 8, Pennsylvania.
Over-the-side heaters for plating tanks, screw plug immersion heaters, radiant heaters and panels, and circulation heaters.

Wyandotte Chemicals Corporation..236
Wyandotte, Michigan.
P. N. Burkard, Manager, Industrial, Railroad and Aircraft Department; R. J. Racine, Manager Industrial Sales; Edward Kubis, Technical Service Department.
Radioactive soils to show with sample metal test pieces differing degrees of cleaning efficiency. A Geiger Counter will show the greater efficiency of properly compounded metal cleaners as contrasted to single detergent materials. Newest products for cleaning and paint stripping offered to the metal working industries. In addition, the following line of Wyandotte products will be exhibited — Burnishing, Burring, Emulsion Cleaning, Washing Machines, Spray Booths, Vats and Steam Guns, Phosphating, Compounds, Floor Absorbents.

Refer to page 53

Surface Treatment and Finishing of Light Metals

Part VI.—Anodizing of Aluminum

By S. Wernick, Ph.D., M.Sc., F.R.I.C., F.I.M. and R. Pinner, B.Sc.

WHILE the chemical conversion treatments already described play an important part in the finishing of aluminum. they do not compare with anodizing either for quality of finish or range of application in industry. The coatings obtained by electrolytic means are not only superior mechanically, but are also of greater corrosion resistance, while they form a very suitable base for absorbing lightfast dyes and it is thus possible to obtain some of the most attractive finishes in color by this means. In the present article and those following it is intended to give an account of the more important industrial anodic processes and their applications.

Theory

When a current is passed through an electrolyte, in which an aluminum anode is employed, the negatively charged anion migrates to the anode, where it is discharged with a loss of one or more electrons. In an aqueous solution the anion consists in part of oxygen, which unites chemically with the aluminum, the result of the reaction depending on a number of factors, particularly the nature of the electrolyte, the consequent reaction products which are formed, and the operating conditions such as current, potential, bath temperature, time of treatment. In general, the following oxidation reaction at the anode can occur:

(1) The anode reaction products may be soluble in the electrolyte. In this case the metal is dissolved until the solution is saturated. This reaction takes place in some strong inorganic acids such as nitric or hydrochloric acid, and strong monobasic organic acids.

(2) The reaction products may be almost insoluble in the electrolyte, and form a strongly adherent and non-conducting film on the anode. In this case film growth continues until the resistance of the film prevents the current from reaching the anode. Films formed in this way are extremely thin, and dielectrically compact. They can be formed in sodium-carbonate or boric-acid solutions. Such films, formed at over 10^8 volts per cm., find application in the protection of electrolytic condensers.

(3) The reaction products may be sparingly soluble in the electrolyte, and form a strongly adherent film (which is non-conducting when dry) over the anode.

In this case film growth takes place as above, but is accomplished by dissolution of the film at the surface. Pores are thus formed in the coating which are wide enough to allow continuous access of the current to the metal. Film growth continues, therefore, though it is gradually retarded as the film grows thicker and the electrical resistance increases. When the rate of film growth has decreased until it is equal to the rate of dissolution of the film in the electrolyte, the film thickness remains constant.

The maximum film thickness varies with the electrolyte and operating conditions, especially the temperature, which affects the dissolution velocity. The way in which the film thickness and thickness of the basis sheet varies with time is shown in Fig. 1.

These are the conditions of the industrial anodizing processes which are based chiefly on chromic, sulphuric or oxalic acids.

(4) The reaction products may be sparingly soluble and form a non-adherent film. In this case, if a suitable electrolyte of high concentration is used, electropolishing may be possible.

Apart from the reactions considered, there are a variety of less important possibilities, i.e. where the reaction product may form loosely adherent, spongy or powdery deposits, as when anodizing solutions become contaminated or under special operating conditions. Or again, a continuous adherent insoluble film, a few molecules thick may render the metal passive.

Types of Anodizing Processes

Among the very many electrolytes to be found in the patent literature, very few are of industrial importance, and these are usually based on the acids mentioned above, i.e., chromic acid, sulphuric acid or oxalic acid. A list of the best known of these processes is given in Table 1. In this connection, it should, however,

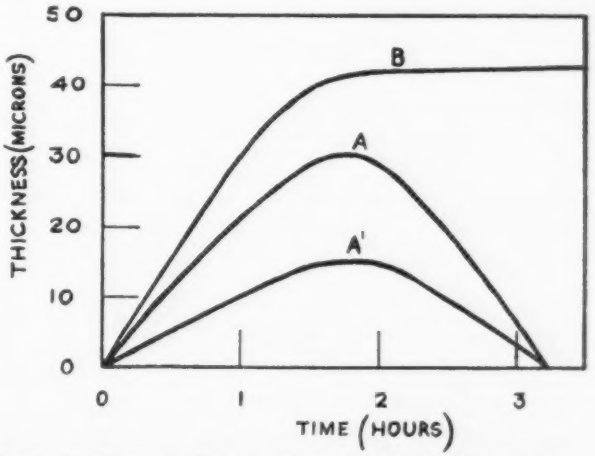


Figure 1. Change in thickness of metal sheet (A. A') and thickness of coating (B) in H_2SO_4 at 1.6 amp./sq. dm. d.c., and 20°C.[13]

TABLE I

Anodizing Processes in use for Decorative and Protective Applications

Type	*Name or Description*	*Electrolyte composition*	*Current amp./ft.² density*	*Voltage*	*°C. Temp.*	*Treatment (min.) time*	*Color*	*Film (mil) thickness*	*Applications*	*Ref.*
Chromic acid	Bengough-Stuart	CrO_3 2.5-3.0%	1-5	0-40 40 40-50 50	40	10) 20) 40* 5) 5)	Opaque Grey	0.1-0.2	For protection; more rarely for decoration. Not for alloys containing more than 5% heavy metals. Coating not sealed.	3, 5
	Accelerated chromic acid	CrO_3 5-10%	1.5-3.0	40	35	30	Opaque Grey	0.08-0.12		
Sulphuric acid	Alumilite, Eloxal GS	H_2SO_4 10-20%	10-20†	10-20†	20-30†	10-30†	Transparent colorless	0.2-0.8	Hard, protective coatings, good base for dyes. Sealed for max. corrosion resistance. Not used on work with joints.	2, 3, 6, 14, 19
	For thick film	20%	20-45	23-120	1-3	up to 240	Greyish	Up to 8	Max. wear resistance & absorptive capacity, i.e. for lubricants.	
Oxalic acid	British and American practice	$(COOH)_2$ 5-10%	10-15	50-65	30	10-30	Semi-transparent	0.6		4
	Eloxal GXh	$(COOH)_2$ 3-5%	10-20	40-60	18-20	40-60	Yellow	0.4-2.5	Both protective and decorative.	
	Eloxal GXL	$(COOH)_2$ 3-5%	10-20	30-35	35	20-30	Almost colorless		Now largely supplanted by sulphuric acid.	13
	Eloxal WX	$(COOH)_2$ 3-5%	20-30	40-60 a.c.	25-35	40-60	Yellowish			
	Eloxal WGX	$(COOH)_2$ 3-5%	20-30 10-20	30-60 40-60	20-30	15-30	Yellowish			
	Thick films	$(COOH)_2$ 3-5%	10-20	40-60	3-5	—	Yellow	Up to 25	As thick H_2SO_4 films.	13
	Ematal	$(COOH)_2$ + Ti Zr or Tl	2-3 until voltage is 120 v. then voltage is kept constant.		50-70	20-40	Opaque, porcelain or enamel tone	10-18	Protective or decorative. Spec. non-metallic appearance.	9
Boric acid	Condenser processes	H_3BO_3 9-15% Borax 0-0.25%		50-500 230-250	90-95	—	Iridescent	0.1-0.3	Thin dielectric films for electrolytic condensers.	4, 31

*The original Bengough-Stuart patent recommends a slightly longer voltage-time cycle, lasting 60 min. The cycle given is the one in common practice at the present time.
†Various constructions of conditions are used for different applications, for each of which, however, operating conditions are often critical.

be remembered that operating conditions may vary within wide ranges, and those given are normally the standard procedure in use with pure aluminum.

Of the processes mentioned, the first to be introduced was the Bengough-Stuart[5] chromic acid process developed in 1923 for the protection of duralumin seaplanes. The process is still widely used in Britain, though in America it has been largely replaced by an accelerated process which employs a more concentrated solution and, besides being speedier, uses a constant voltage in place of the complex Bengough-Stuart cycle, thus facilitating the use of automatic equipment. A further modification of this process was developed in America by the Battelle Memorial Institute[7] during the last war, in which process a 5 to 10% chromic acid solution is renewed with additions of sulphuric acid.

The most widely used anodizing processes at the present time are those using sulphuric acid, and the first of these was patented by C. H. R. Gower and S. O'Brien Ltd.[8] in 1937 in Britain, though their industrial development first took place in the U. S. A. A wide range of operating conditions is used to vary with specific requirements. These processes include the Alumilite process, while on the Continent, the sulphuric acid process is known as Eloxal GS.*

The oxalic acid processes first developed by Hoyin, Rikagu and Kenkyuge in Japan, have come into use mainly on the Continent and include d.c. as well as a.c. processes. Confusion must be avoided in the use of the word Eloxal; in British and American literature the name Eloxal is often used synonymous with oxalic processes, though German authors in particular often use the word to cover the d.c. sulphuric acid (Eloxal GS) process. Other processes include the Ematal process developed in Switzerland in 1935, which uses an oxalic acid solution containing titanium, zirconium or thallium salts, to produce a non-metallic appearance resembling porcelain or enamel, the boric acid process used for electrolytic condensers, and the sulphamic acid process[4] recently developed by Piontelli in Italy, which has found some limited industrial application in the U.S.A.

Application of Anodizing

The first application of anodizing was for dielectric films for use in electrolytic condensers produced by the boric acid process and is still in use today. A general classification of present day applications of anodizing include the following:

(1) Protective — for protection against (a) corrosion, (b) abrasion.

(2) Decorative — to protect polished and other mechanically finished surfaces.

(3) As a base for paints and other organic finishes.

(4) As a base for electrodeposits.

(5) Specialized applications associated with specific properties of coatings, e.g. electrical and thermal insulation, the highly porous and absorptive character of the coating, which suggest the use of thick coatings on bearings and cylinders, hardness and wear resistance, etc.

PROTECTIVE APPLICATIONS:

The chromic acid processes give a comparatively thin but corrosion-resistant coating and are in use both in Britain and the U.S.A. for civil and military aircraft parts, navel equipment, etc., particularly where riveted structures or parts with laps, joints or crevices are to be treated. The coatings are not, in general, as resistant to wear as those produced in the sulphuric acid processes and the process is not suitable for alloys containing more than 5% of heavy metals.

The sulphuric acid coatings, on the other hand, are thicker (approx. 0.2-0.8 mil) and, if sealed subsequent to anodizing, give better corrosion resistance, as well as being harder and more wear resistant. The process cannot, however, be used where riveted or jointed parts are to be treated as traces of electrolyte remaining in the crevices are corrosive. All the common aluminum alloys can be treated satisfactorily though the color will sometimes be affected by alloy composition. In general, the sulphuric acid process is cheaper than the chromic acid process, though the need to seal work for maximum corrosion resistance must be counted as an additional operation in the former.

The oxalic acid process is not in widespread use in Britain and America. It is more expensive due to the high cost of the electrolyte and the corrosion resistance is, for most applications, inferior to the sulphuric acid processes, though much depends on the operating conditions and the efficiency of the sealing operation.

The oxalic acid process is at the present time, therefore, used mainly for specialized applications or where thick coatings are required. Coatings of up to 2.5 mil are produced in the Eloxal GX process without difficulty. Coatings thicker still can be produced both in oxalic acid or sulphuric acid at low temperatures (below 10°C.) sometimes with the use of internally cooled anodes. Other specialized applications are the use of the a.c. oxalic acid process Eloxal WX for anodizing wire and elastic strip due to the greater ductility of the coating and the use of the a.c.-d.c. process GWX for maximum wear resistance on certain aluminum-manganese alloys.[12] On aluminum-magnesium alloys containing 7% of magnesium or more, the Eloxal GX process is used in preference to the sulphuric acid process for the same reason.

DECORATIVE APPLICATIONS:

Except in a few cases, the d.c. sulphuric acid process is the most useful, due to its color and its greater adsorptive power.

The sulphuric acid coating is clear, transparent and colorless on aluminum and most alloys. Exceptions to this are manganese and high silicon-containing alloys and heterogeneous aluminum-magnesium alloys on which the coating may be grey to brown or patchy.

The great adsorptive power makes the coating an excellent base for dyes, especially if the coatings are subsequently sealed in nickel or cobalt acetate solutions.

The natural transparency of the coating make it suitable also for the protection of electropolished reflector

*Eloxal stands for "Electrolytisch Oxidiertes Aluminium" and is the name adopted by leading German manufacturing firms controlling development of these processes. The initials designate the type of process (see Table I).

surfaces where the reflectivity is almost completely retained.

The oxalic acid processes are generally inferior for most decorative applications though lightfast and weatherfast natural colors varying from 'silver' to 'old brass' shades may be obtained by the Eloxal GX and GXh processes, the exact shade being rather critically dependent on the operating conditions, such as the thickness of the coating (treatment time) and it is often difficult to match colors exactly. Oxalic acid coatings do not dye as well as those produced in sulphuric acid.

Coatings produced in chromic acid baths are more or less unattractive. They are generally opaque grey and iridescent, depending on the concentration and purity of the electrolyte though, in the presence of 0.03% sulphate, colorless transparent coatings have been obtained.[7]

The coatings are thin and of low porosity and, hence, are difficult to dye. In concentrated solutions at raised temperatures, however, black coatings may be obtained while, as in the oxalic acid Ematal process, attractive opaque coatings may be obtained in chromic acid by the addition of titanium, zirconium or thallium compounds.

ADHESION OF ORGANIC FINISHES:

Anodic coatings in their unsealed condition are an excellent base for paints, lacquers, resins, etc., and such finishes produce the best possible corrosion and wear resistance for aluminum and its alloys. This combination has, therefore, been extensively used for aircraft and marine applications, especially where the work had to stand up to exposure to sea water.

The good protection obtained in this way is due to (a) the porous and highly adsorptive nature of anodic coatings; (b) their chemical and electrical inertness and (c) the increased abrasion resistance afforded by anodizing.

In recent times, the practice of using anodic coatings as a base for paints has become less widespread, due in part to the increased development of clad alloys as well as the improvement in chemical conversion treatments and better paint systems. This can be readily understood, if it is remembered that the cost of chemical conversion treatments is sometimes only 5% of the cost of anodizing, while paint adhesion and corrosion resistance of such coatings is sufficient for the majority of applications. As was emphasized in a previous article, the corrosion resistance in terms of life under salt spray of a painted aluminum part in service conditions depends to a greater extent on the paint system itself than on the pretreatment and, in general, it is only where the work is subject to severe conditions of wear that anodizing prior to painting pays for itself. In such conditions, anodic oxide films will both withstand abrasion and prevent paint-lift spreading from a local scratch.

The Oxide Film and Theory of Anodic Oxidation

The mechanism of anodic oxidation is very complex and is still largely controversial. The theories developed are numerous and complicated and will be dealt with only briefly.

COMPOSITION OF THE COATING:

As will be remembered from the discussion of aluminum oxide films in general the composition of coatings depends largely on the electrolyte employed and differing and sometimes contradictory conclusions have been reached by different workers.

Thus, Pullen[15] found chromic acid films to consist entirely of anhydrous Al_2O_3 with less than 0.1% chromium, while Bengough and Sutton[16] found 0.4 to 0.7% chromic acid in similar coatings. In sulphuric acid and oxalic acid coatings, Pullen determined water equivalent to $Al_2O_3 \cdot H_2O$ (15.06% H_2) and 13% SO_3 and 3% $(COOH)_2$ respectively. Edwards and Keller found 1% and 6% water in two sulphuric acid coatings.

Phillips[48] reports a water content in oxalic acid content of coatings produced in oxalic acid equivalent to the formula $2Al_2O_3 \cdot H_2O$.

Anhydrous aluminum oxide is very hygroscopic even when treated to red heat, and the electrolytically produced coating is like a gel in equilibrium with the vapor pressure. As electric conductance of the film is proportional to its moisture content, this property has recently been utilized in an instrument designed to determine humidity.[18] It is generally accepted now that the water in the film is not chemically linked except in the immediate surface layers of the oxide film, which is probably in the form of $Al_2O_3 \cdot H_2O$.

Most investigators, are agreed that the coating consists of anhydrous Al_2O_3 which is either amorphous or in the γ—Al_2O_3* or γ—Al_2O state, though there is disagreement between these different forms. Other authors found the Al_2O_3 structure by X-ray diffraction on coatings produced in oxalic acid.[49] and in boric acid.[50] The process of γ Al_2O_3 was shown also by Vernoley, who worked under conditions where barrier type films are obtained and concluded that at the high initial local voltages, over 10^7 v./cm, the current is not determined by Ohms law.

Verney found that the electron conductivity was 10^4 greater from the aluminum though the aluminum oxide to the electrolyte than in the opposition direction. Impedance measurements however showed that the coatings consisted of an insulating layer of specific resistance 10^{11} ohms/cm and a conducting layer of specific resistance 10^7 ohms/cm. The thickness of the latter is independent of the total thickness. $1\text{-}2 \times 10^{-5}$ mm. The specific resistance of the insulating layer dropped when current flows in the forward direction. Little difference in oxide structure or thickness is found over different crystal faces.[43]

Harrington and Nelson[20] found coatings produced in sulphuric, phosphoric and oxalic acids, trisodium phosphate, borax and ammonia to be amorphous, while Edwards and Keller[17] found electron diffraction patterns of high voltage boric acid films to be crystalline with a γ—Al_2O_3 structure. Taylor, Tucker and Edwards,[21] using X-ray diffraction on anodic coatings, produced on 99.8% aluminum foil, made no distinction between the γ—Al_2O_3 and γ^1—Al_2O_3 forms. These

*γ—Al_2O_3 is intermediate in formation temperature between the two α Al_2O_3 stages while the γ^1—Al_2O_3 is the form produced on heating the monohydrate γ—$Al_2O_3H_2O$ to 650°C.

authors investigated a large number of coatings produced by various methods and found all of them to consist largely of amorphous oxide, with a percentage of the γ—Al_2O_3 form in some cases. In general, high potential was found to favor formation of the crystalline lattice which also tended to form in dilute solution, i.e., at less than 0.1% oxalic acid, 0.1 to 0.5% chromic acid or 0.05% sulphuric acid. Larger amounts of the crystalline oxide were found using a.c., as well as at higher temperatures. The largest amounts were obtained with dilute citric acid at 670 volts and 95°C.

More recently, J. J. Trillat and R. Tertian[24] investigating coatings at 1μ and 20μ obtained in 20% sulphuric acid at 20°C., 12 volts and 1 to 5 amp./sq. dm. on 99.99% aluminum by electron diffraction, found a crystal structure consisting of a mixture of the monohydrate and the γ-oxide or a non-classified transition form at the extreme top layer. The lower layers of both coatings were amorphous. It must be remembered, however, in connection with these findings that, in the presence of moisture, the amorphous oxide coating is gradually transformed into the monohydrate.

Paleolog and Akimov found that the electrode potentials of sulphuric acid anodized 99.995% aluminum sealed in boiling water was 0.2 V in sodium chloride solution, this value drifted gradually to —0.5 to —0.3 volt, the normal value for the untreated metal. In sodium sulphate solution the potential of the untreated metal ions—0.3 to —0.1 v, for anodized metal —0.3 to 0.2 v, and, for the sealed metal, —0.1 to + 0.2 v.[46]

From the electron diffraction patterns obtained on freshly formed coatings, Harrington and Nelson calculated a grain size of approx. 12 Å. Brummough and Cooke are quoted by Phillips[48] as finding a rather lower value, 5-10 Å which increased on sealing in boiling water to 100-250 Å the Bohmite pattern being obtained. Phillips also reports that other electron diffraction patterns which could not be assigned to any known form were found by Finch.

The Dielectric or Barrier Layer

It was already shown in 1932 by S. Setch and A. Miyata[23] that the anodic oxide film consists of two layers, the porous thick outer layer growing on an inner layer, which is thin, dense and dielectrically compact, and variously called the active layer, barrier layer or dielectric layer. This layer is very thin, i.e. usually between 0.5 to 2.0% of the total film, and its thickness depends on the composition of the electrolyte and operating conditions.

The dielectric layer is formed first at a high voltage and its thickness varies directly with the forming voltage and inversely to the dissolution velocity (i.e. the solubility) of the oxide in the electrolyte. In the industrial anodizing processes, where the dissolution velocity is fairly high, the dielectric layer is extremely thin. In the boric acid electrolyte, on the other hand, the dissolution velocity is negligible and the dielectric layer is the whole film. An average value for the thickness of the dielectric layer, as present in normal anodizing, is approximately 0.03 to 0.05μ.

The dielectric layer, formed first, is non-porous and conducts current only due to its thinness and faults in the skeleton. The outer layer, on the other hand, is micro-porous, and built upon a columnar structure.[17]

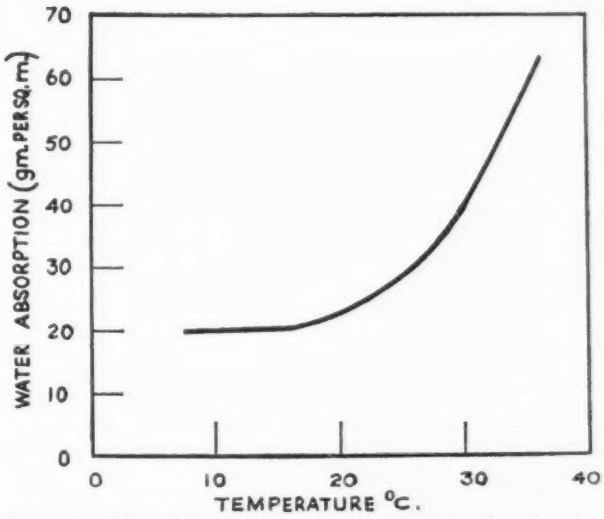


Figure 2. Effect of bath temperature on water absorption of coating, i.e. porosity. Film 10μ thick prepared in 20 per cent H_2SO_4 at 2 amp./sq. dm., subsequently immersed in boiling water for 30 min.[13]

The thickness of the barrier layer is thus a function mainly of the forming voltage and is as shown by Haas[41] as long as no dissolution occurs in the electrolyte, the layer is formed to a thickness of 14 Å per volt.

This is the theoretical maximum approached only in solutions in which little or no solvent action occurs, e.g. Holland and Sutherland[17] obtained film thicknesses of 13 Å per volt in 3% ammonium tartrate solution used in the protection of vacuum coated aluminum mirrors.

After the barrier layer has reached this limiting thickness, only a very small leakage current can pass, the amount differing with the alloy composition.[36] In the commercial process, solvent action of the electrolyte is superimposed and the final barrier layer thickness is then reduced by an amount depending on the electrolyte.

New light has recently been shed on the growth of the barrier layer by work,[34,37] during the course of which was developed a method for measuring this layer.

Porosity

As well as the thickness, the porosity of the coating varies with the dissolution velocity and the rate of film growth, and these depend on the operating conditions and the type of electrolyte. Due to the effect of dissolution, the outer layers of the coating have the greatest porosity. Examination by optical and electron microscope show the presence of pores on the striated structure. Edwards and Keller[17] also found vertical lines 6×10^{-8} in. apart near the metal interface which, they believe, locate the pore centers from which the coating grows, and estimated a number of 10^9 pores per sq. in. from their photographs. The pores are parallel and normal to the surface and are large enough to carry the current while too small to carry solids in any but very finely dispersed colloid form.

The pores are very adsorptive and Edwards[25] determined that when a film formed in sulphuric acid, with a volume of 14 ml./sq. m., was boiled in a 1% potassium dichromate solution for one hour, the coating took up 0.48 g./sq. m. chromium, i.e., the dichromate content of 140 ml. of solution or ten times the volume of the coating, was absorbed and concentrated in the

pore surface as fresh solution continued to diffuse into the pores. The effect of anodizing temperature on the absorption capacity of the film, i.e. also its porosity, is shown in Fig. 2.

The largest pore diameter is found in the oxalic acid films, particularly in films produced by the a.c. process. The actual values given vary widely. Thus Fischer and Kurz[26] found, by direct electron microscope examination, that thin d.c. sulphuric acid films have approximately 800 pores per sq. μ (pore diam. 0.015 μ; porosity 13.4%) while d.c. oxalic acid coatings gave 60 pores per sq. μ (pore diam. 0.075 μ; porosity 8%, amended to 12% to allow for pore sections not appearing on the surface due to their direction.) Kubaschewski and Von Krusenstjern[45] distinguished between macropores with the naked eye or at 30X magnification and micropores of an average diameter of 0.04 μ. No pores have been found in the dielectric layer, and Edwards and Keller,[27] examining films formed in ammonium borate and disodium phosphate, found no determinable structure under the electron microscope. The relationship between porosity and film thickness was investigated by K. Huber and A. Gaugler[31] who studied coatings in polarized light. Electronmicroscope investigations by Lacombe, Beaujard and Morize,[32] who separated the oxide coatings by dissolving the aluminum away in a perchloric acid electropolishing bath, showed the coating to consist of an aggregate of micro-crystals subject to a double orientation effect, though the material found in the coating offers no explanation of this. Huber and Gaugler applying Wilmer's[32] theory of columnar mixed bodies, determined values for porosity which showed a marked increase towards the exterior of the coatings. In this way, coatings produced by an 8 hour treatment at 16 volts d.c., in M sulphuric acid were found to have a porosity of 4.3 to 4.4% near the metal and 15.5 to 16.9% near the electrolyte.

Chromic acid coatings, due to their relatively low solubility, are more closely allied to dielectric films and have a small pore diameter. The total porosity of coatings formed in chromic, sulphuric, and oxalic acid baths, have been variously estimated from 12 to 30%.

Recent work on the mechanism of anodic oxidation show that the number of pores and their volume are largely dependent on the forming voltages.

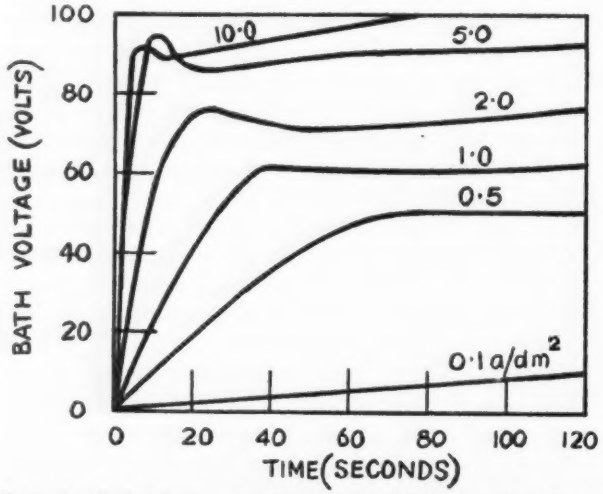


Figure 3. Bath voltage at constant current densities in relation to the treatment time in 2 per cent oxalic acid, d.c., and at 17 to 18°C.

While the ratio of effective 'metal surface' to apparent surface is extremely low, i.e. the effective current density is very much larger than the calculated, the pore area is extremely large. Thus Tomashov and Tukina,[28] from a pore diam. of 0.1 μ and 25% total porosity in a sulphuric acid coating of 4.3 μ, calculated a 'true' surface area of 23.5 sq. dm. per sq. dm. of apparent surface.

Mechanism of Film Growth

There is little disagreement concerning the formation of the porous outer layer (i.e. the 'visible' layer), though many and sometimes contradictory theories have been put forward to account for the formation of the dielectric layer.

When aluminum is made anodic in the anodizing electrolyte, it will depend on the operating conditions, i.e. voltage, solubility of the reaction products, e.g. concentration, hence temperature, etc., whether the anion of the electrolyte itself reacts with the metal. Thus, J. Glayman gives two possibilities in his diagram for the reactions in a sulphuric acid electrolyte, in one of which the O^- ion and water react directly with the aluminum, while in the other the aluminum sulphate first formed is then hydrolyzed to the hydrate. Once oxide has been formed on the metal surface, the anion can no longer make contact with the aluminum. The oxidation reaction is given empirically by the simple equation

$$2\,Al + 3O \rightarrow Al_2O_3 + Energy$$

which takes place at the metal oxide interface. The first of the important theories of the mechanism of this reaction was put forward by Setch and Miyata in whose opinion the barrier layer allows the passage of nascent oxygen which is formed from the water in the pores, and acts continuously on the aluminum to produce a new barrier layer. The pores are the result of anion attack, and oxygen locked in the pores of the barrier layer or events contact between the metal and the solution, and is responsible for protecting the barrier layer.

T. Rummel suggests that due to its thinness, the barrier layer is holed through by the current with the formation of pores. A new layer is then formed underneath the porous film and this process repeated (see Fig. 4) until the length of the pores is such that insufficient voltage remains for film growth. According to this author, gas evolution, facilitated by a pore acting in opposition to the capillary and electrostatic attraction between electrolyte and metal helps the transport of the current and oxygen.

The visible film is formed in the same way as the barrier layer, except that the surface oxide is converted by the electrolyte into hydroxide which is semi-conducting, and does not hold any charges, but allows free access to the pores.

An early but somewhat different theory was advanced in 1934 by one of the present authors.[51] According to this, aluminum hydrate forms at the anode due to hydrolysis, in the form of a negatively charged colloid. The peptized gel forms a net-like sponge over the metal and, under d.c. tends to expel the electrolyte by cataphoresis; on the other hand, under a.c. conditions,

it will alternately absorb and expel the electrolyte.

Wernick also demonstrated the effects of anodizing time on film growth and on the dimensions of the part showing that the total film thickness goes through a maximum with anodizing time and demonstrating the rapid and practically linear decrease in coating thickness if the current is interrupted in the anodizing bath. A further interesting finding was that, in anodizing in sulphuric acid, the depth of the coating to which a dye would penetrate was practically identical with total film thickness up to approximately 0.75 mil but then remained at this value, irrespective of the total coating thickness.

In the same paper, Wernick demonstrated a novel technique for the physical detachment of the oxide film, the thickness of which could then be measured directly. The method is based on the affinity of mercury for aluminum. Some of the oxide is detached from the sample by mechanical local scraping and the bared portion is immediately immersed in a saturated solution of mercuric chloride for a short time. It is then dipped directly into a quantity of mercury, some of which then adheres to the exposed aluminum. If the sample is then placed in distilled water with the mercury blob uppermost, the mercury continues to react with the aluminum, thereby undermining the oxide film which is detched and floats away in the form of small irregular pieces, which may then be dried and examined.

These earlier theories were taken further by W. Baumann,[30] who concluded that film formation begins at points at the base of the pores.

This islet theory was demonstrated also by Edwards and Keller,[27] who investigated boric acid coatings on 99.99% aluminum sheet. When the film was bent, the film crazed in a network which included fine cracks. Further anodic treatment in sulphuric acid showed that film growth started at the base of each crack, ultimately forming a uniform smooth layer.

Following on the earlier theories, Schenk[13] calculated the volumes of the atoms and ions involved in the reaction and found that, when assuming the closest possible packing of the anode, a volume increase of 48% is involved in the change of Al to Al_2O_3. Again while the aluminum atom decreases to 1/23 of its size when ionized to Al^{+++}, the O atom is enlarged by almost the same amount when reduced to O^{--}. From values for pore diameters, Schenk concludes that it is unlikely that the O^{--} ion can pass through the coating, but that atomic oxygen takes part in the reaction in the absence of water.

Recently work carried out by Keller, Hunter and Robinson[34] has thrown some light on the formation of the anodic coating. These authors showed the structure of the porous anodic coating by electronmicroscopy.

The actual conditions at the barrier layer which influence the growth of the porous coating have been discussed by Hunter and Fowler.[37] As these authors point out, anodizing in a 15% sulphuric acid solution at 21°C. and 12 amp./sq. ft. will produce a rate of growth of approx. 0.88 mil per hour, equivalent to 3725 Å/min. and this should correspond to a similar rate of dissolution at the base of the pores. In practice the rate

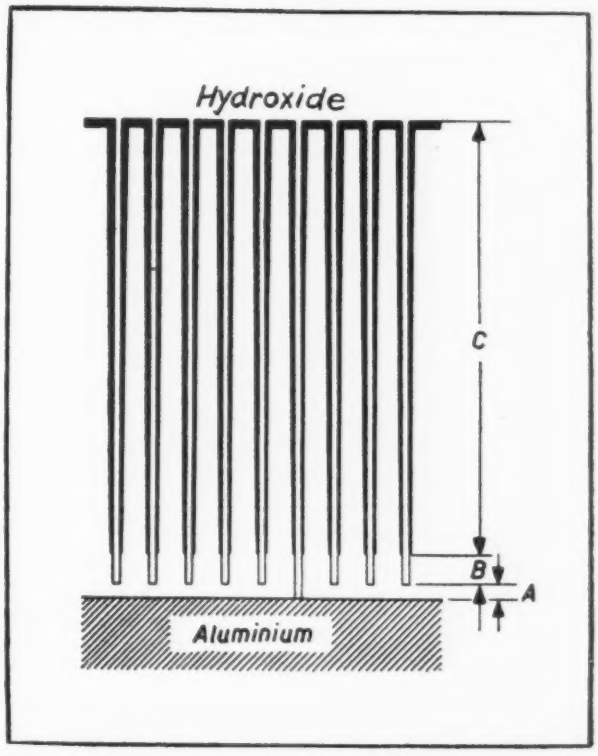


Figure 4. Diagram showing formation of the anodic oxide film according to Rummel.[30] A. Original oxide layer partially broken through. B. Oxide layer formed from original layer but not yet reached by electrolytic. C. Oxide-hydroxide layer in contact with electrolyte.

of dissolution under these conditions is found to be only 0.84 Å/min. This difference is accounted for by a local rise in temperature coupled with an increase in concentration.

This theory would seem to be very unlikely not only as it would be difficult to account for the suggested rise in sulphuric acid concentration, but this value would not take into account the fact that this solution rate is in fact much too high for the solubility of aluminum in the acid and the comparatively low diffusion rate through the pores. Much more probable is that the barrier thickness layer remains constant only because it is determined by the voltage, i.e. growth is not balanced by dissolution at the pore base, but by conversion to porous type coatings.

The facts, on consideration of these operating conditions, show the existence of a pronounced temperature and concentration differential between the bulk of the electrolyte and that at the pore base, and this points to the considerable importance of agitation in determining the properties of the coating.

Secondary Reactions

Depending on the nature of the electrolyte, secondary reactions may take place which may affect the character of the coating, and are often responsible for differences in color, corrosion resistance and other properties.

Chromate, oxalate or sulphate found in coatings is thought to be due to reaction of the anion of the electrolyte with the oxide or its monohydrate to form basic salts. Alternatively, instead of reacting with the oxide, the anion may itself be split up and oxidized. This

occurs more frequently in the case of oxalic acid, which is decomposed according to

$$(COOH)_2 + O \rightarrow 2CO_2 + H_2O$$

Decomposition of sulphuric acid and chromic acid is rare as, generally, the discharge potential of the oxygen ion is lower than that of the electrolyte anion.

Jenny[12] quotes experiments demonstrating that reduction of oxalic acid also takes place at the cathode. Oxalic acid here is converted first into glyoxalic acid then into acetaldehyde or glycol.

At the anode, gas analysis has shown the presence of carbon dioxide, carbon monoxide, oxygen, hydrogen, and nitrogen, the proportions depending on the current density. At lower current densities less oxygen is evolved, while the production of carbon dioxide rather than the monoxide is favored. The hydrogen found by Beetz (quoted by Jenny) in the anodic gas in sulphuric acid solution comes, according to Schenk,[13] from electrolytic dissociation of water in the pores. In this connection, Schenk also declares that, due to the high e.m.f., the oxide coating acts as an electrolytic cell in which oxalic acid will not only be oxidized but also reduced. The yellow color of the coating (due to organic material) is taken as evidence of this reduction, an argument which could be supported by the fact that at higher temperatures (GXh process) the color of the coating is much lighter.

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Standardization of Chromium Bath Tests On a Bent Cathode in the Hull Cell

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This is the second and final installment of Mr. Rousselot's article. Part I appeared in the May issue. —Ed.

PART II.

Study of C.P. Variations under Simple Conditions

The factors on which covering power in chromium plating baths depends are divided into two groups:

1. Factors involving the base metal.
2. Factors concerned with the bath used and its operating conditions.

FACTORS INVOLVING THE BASE METAL:

Tucker and Flint demonstrated, in a remarkable study,[6] that the covering power depends on the nature of the metal used as base, the condition of its surface (polishing and buffing), and on the preparation of the surface before plating (cleaning and degreasing).

Therefore, in order to study, by way of example, the effects of certain factors of the second group, it was necessary to select simple and constant conditions as factors of the first group. The conditions selected were the following:

Base Metal: Brass, 70-30 alloy, thickness 0.8 mm.; selected for good contrast between brass and chromium.

Polishing: By new cotton buff with a tripoli composition, at a surface speed of 35 meters/second.

Cleaning:

Rubbing with cellulose paper.
Brushing with trichlorethylene.
Rubbing with filter paper.
Second brushing in clean trichlorethylene.
Rubbing with filter paper.
Rubbing with white cotton rag.

Chemical and electrolytic degreasing is ruled out because of possible alteration of the surface and because of their difficulty of exact reproduction.

FACTORS CONCERNED WITH THE BATH:

These factors include chiefly the composition of the solution, the average current density and the temperature. In order to study more especially the variations of C.P. according to the composition of the bath, the total current was uniformly fixed at 4 A (or 8 A/dm.^{2}) for the reason already mentioned, and the temperature adopted was 35° ± ½°C.

It is obvious that these experiments could be conducted at other temperatures also, but the use of a different total current would be of no value. This latter point calls for an explanation:

Since the current distribution curves are homothetic in their ordinates if, for a total current of I_1 (See Fig. 8), a characteristic (C.P. for example) appears at point A_1, plating with the same bath at a current of I_2 will bring the above characteristic to point A_2, but it is evident that the reading of the curves for both I_1 and I_2 will show the same local current density at the point considered.

This disproves, if it were necessary to disprove it, the statement often heard to the effect that raising the average current density increases the covering power of chromium baths. Increasing the current density

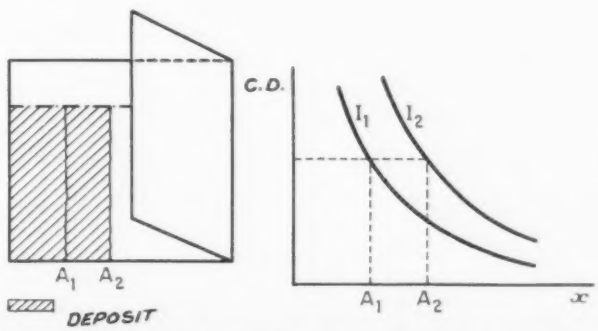

Figure 8. Result of increasing total current.

does nothing but move the point where the deposit begins to form (and in this way a deposit can be obtained in a recess where previously there was no deposit). It does not change the current density characterizing that point, i.e. the covering power value.

DETERMINATION OF THE C.P.:

The following three factors thus remain: covering power measured in the cell, chromic acid concentration, and sulphuric acid consideration. The chromic acid used was of the chemically pure grade, practically free from trivalent chromium and iron. The sulphuric acid was added in the form of a solution at 100 grams per liter.

The method of operation is the following: a bath, made up to a certain concentration for one component, and contained in a one-liter beaker, is heated to 38°C. After adding the desired quantity of the variable component, and stirring, an Erlenmeyer flask, specially, marked, is filled to 270 cc., and poured into the cell. When the cell thermometer reads 36°C., the cathode is installed and, at 35°C., the plating is started and continued for 3 minutes. The temperature of the bath remains within the prescribed limits during this 3-minute period. The bath (which has lost very little metal) is then poured back into the beaker and a new addition is made for the following test.

In this way from 5 to 6 specimens may be plated with the same original bath, without any appreciable change in the conditions of volume, concentration of the constant component, etc., and with practically no formation of Cr^{+++}. If a bath contains trivalent chromium, a still larger number of specimens can be plated without altering the conditions.

ISOCHROMES:

The C.P. was first measured in baths containing constant quantities of chromic acid, 150 to 400 g./l., with variable quantities of sulphuric acid, from 0 to 6 g./l. The curves thus obtained, called isochromes, are shown in Figs. 9a and 9b.

Let us examine the first curve in Fig. 9a, corresponding to 150 g./l. of chromic acid. Before the addition of 0.2 g./l. of sulphuric acid, no deposit takes place and the C.P. has therefore an infinite value. Then a deposit begins to appear, irregularly and, at about 0.5 g./l., the C.P. attains its minimum value (approximately 1.5 A/dm.^{2}), 42 mm. being covered. The C.P. then increases and again becomes infinite (no more deposit) at about 1.9 g./l.

The other curves are similar in form, but are farther to the right and wider. The important conclusion is that the optimum does not correspond to the ratio CrO_3:H_2SO_4 = 100 but, in this study, chromic acid without trivalent chromium is concerned.

The curves in Fig. 9b continue to move to the right and show a second minimum after the start in the preceding curves. Here also the ratio is higher than 100 (See Table II).

The stable characteristics of these curves are the initial and final branches, as well as the position of the minimum. The central part is not very reproducible, and the reason will be given later.

ISOSULPHATES:

For the purposes of comparison, the variations of the C.P. were also studied in baths containing constant quantities of sulphuric acid, 2 to 3.5 g./l., and variable quantities of chromic acid. The curves obtained in this case, called isosulphates, are given in Fig. 10. They are all similar in form, but show their optimum at the right.

CHARACTER SURFACE:

Since we are dealing with three variable — the C.P., CrO_3 and H_2SO_4 — the curves in Figs. 9a, 9b and 10 are sections of a characteristic surface having as coordinates : x, the H_2SO_4 concentration; y, the CrO_3 concentration; and z, the covering power.

Fig. 12 is a photograph of a model representing this surface. It shows in a more vivid manner the range within which a chromium deposit is obtainable under the conditions indicated.

The two essential conclusions which can be drawn from this study made with pure chromic acid are: the ratio CrO_3:H_2SO_4 = 100, usually given as the optimum is not correct, the central part of the curves is unstable.

THE EFFECT OF TRIVALENT CHROMIUM AND OF IRON:

The isochrome was then plotted for a bath in actual use in the industry, containing trivalent chromium and

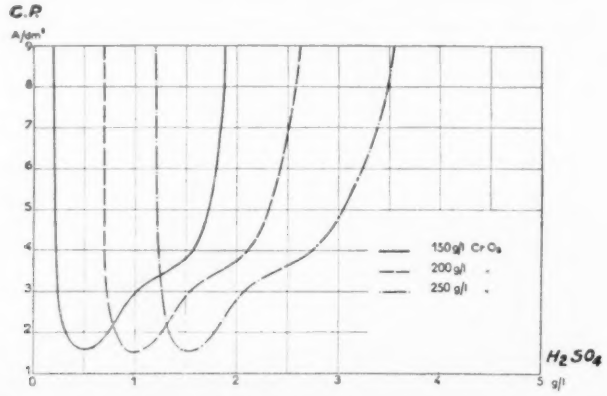

Figure 9a. Covering power with varying concentrations of sulphuric acid and constant CrO_3 (isochromes): for 150, 200 and 250 g./l. CrO_3.

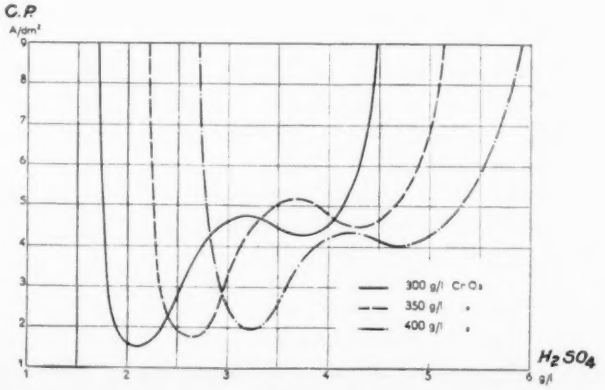

Figure 9b. Curves similar to those of Figure 9a for 300, 350 and 400 g./l. CrO_3.

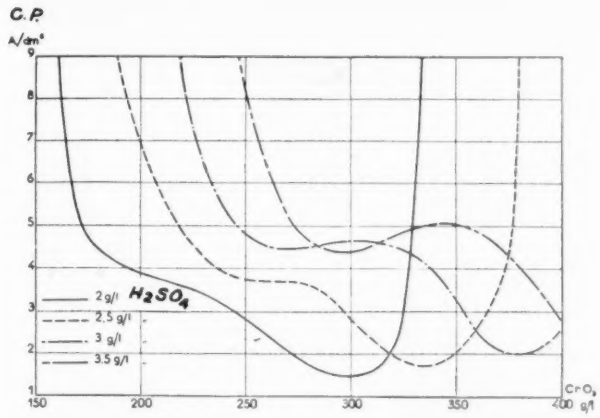

Figure 10. Covering power with varying concentrations of chromic acid and constant H_2SO_4 (isosulphates): for 2, 2.5, 3 and 3.5 g./l. H_2SO_4.

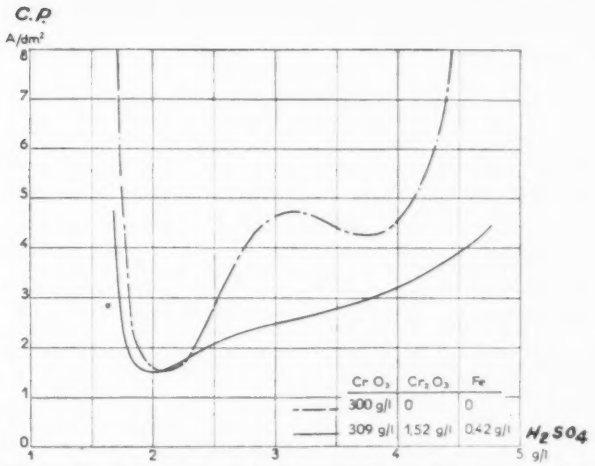

Figure 11. Comparison of bath containing no chromates or iron with industrial bath containing Cr^{+++} and Fe.

iron. It was a 3500-liter (920-gallon) bath, which had been in operation for 16 months, in an automatic installation with a daily output of 300 square meters of parts. It was perfectly controlled (daily additions) and had the following composition:

	Grams per liter
CrO_3	309.00
H_2SO_4	2.36
Cr_2O_3	1.52
Fe	0.42

The method used to plot the isochrome consisted in precipitating a part of the sulphuric acid by barium carbonate, determining the quantity of the remaining sulphuric acid, and then making additions of sulphuric acid from a 100 g./l. solution.

The isochrome obtained is shown in Fig. 11, in comparison with a corresponding isochrome without $Cr.^{+++}$. It will be noted that:

1. The central part is much more regular (the experimental points fall exactly on the curve).
2. The curve is much wider.
3. The optimum is approximately the same.

While we do not claim to draw definite conclusions from this one example, these curves demonstrate why some quantity of $Cr.^{+++}$, even very small, is indispensable in a new bath for its correct operation. The widening of the curve seems to be attributable to the presence of iron. It is also seen that it is better to operate this bath with about 2.4 to 2.6 g./l. of sulphuric acid — avoiding the amount of 2 g./l., which is theoretically more favorable but more difficult to maintain in practice — owing to the fact that a slight decrease of this concentration considerably increases the covering power. We arrive therefore at a ratio of CrO_3:H_2SO_4 = 120-130, which is not far from the ratio generally indicated, but somewhat higher.

TABLE II

CrO_3/H_2SO_4 ratio at optimum points of curves in Figs. 9a and 9b

CrO_3, g/l	CrO_3/H_2SO_4
150	300
200	200
250	155
300	140
350	130
400	125

Conclusion

The method here described enables us to plot the variations of the covering power with a satisfactory degree of precision, taking into account the factors relating to the base metal and progressively varying the factor concerning the bath.

It also permits:

The computation of the optimum operating range for baths utilizing the SO_4, iron, and other ions, or those operating under different conditions (temperature, etc.).

The plotting of the isochrome of an industrial bath, showing its real effectiveness with all known or undetermined components (Cr^{+++}, Fe, etc.).

The checking, by a quick test, whether the covering power (and consequently the concentration of the catalytic ion) is within the required limits, without having to make a long, and sometimes impossible, analysis — an analysis which could not give proper weight to the effects of certain insufficiently known complexes.

The author expresses his appreciation to Professor Audubert, Director of the Electrolysis Laboratory of the French National Center of Scientific Research, for his authorization to publish this study.

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Appendix I

Covering power (C.P.) is defined as the minimum current density at which the deposit begins to form. It expresses the ability for a given bath, of "covering" with metal the recessed parts of the cathode.

Throwing power (T.P.) is the ability of a bath to distribute the deposit more or less uniformly over the different parts of the cathode.

The definition originally given by Haring and Blum[7] was expressed by the equation

$$\text{T.P.} = 100\,\frac{K - M}{K}$$

$$\text{where } K = \frac{d_2}{d_1}$$

The ratio of the primary current distributions* (anode to cathode distances) for two cathode points, 1 and 2, respectively near and remote from the anode.

$$\text{and } M = \frac{m_1}{m_2}$$

The ratio of the weights (or thicknesses) of metal deposited (effective distribution) at the two points considered.

This formula was modified by Field,[8] in order to avoid too high negative values, as follows:

$$\text{T.P.} = 100\,\frac{K - M}{K + M - 2}$$

and T.P. varies between -100% and $+100\%$.

In short, the C.P. is a current density expressed in A/dm.^{2}, and the T.P. is a function expressed as a percentage.

Appendix II

Note 1. — Equation [1] differs somewhat from the equation given by Hull.[4] It is based on the average results of a number of experiments with a copper fluoborate bath. Tucker and Flint[6] had already observed a discrepancy and had proceeded to make new measurements by weighing stripped segments of a chromium deposit and deducing the secondary current density, the cathode efficiency at the different current densities being known. Although their method is quite different from the one reported here, Tucker and Flint's curve and the one recorded by the author coincide to a satisfactory degree. The difference observed in Hull's curve probably results from concentrations of the current lines on the edges of the copper strip which he used.

Note 2. — Current distribution on a slanting cathode is, experimentally speaking, a logarithmic function of the form:

$$i = I\,(k_1 - k_2 \log x).$$

This equation, represented with logarithmic abscissae and proportional ordinates, gives a straight line, of

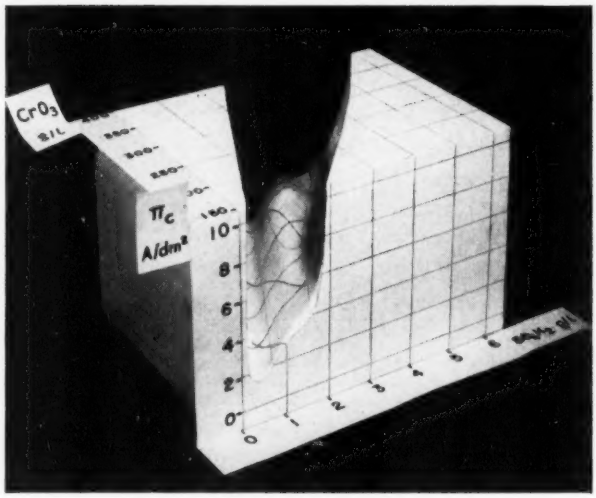

Figure 12. Characteristic surface of the C.P. with varying concentrations of H_2SO_4 and CrO_3. Sections of this surface parallel to the plane xOz indicate the isochromes. Sections parallel to the plane yOz indicate the isosulphates.

which (if I = 1) k_1 is the ordinate for x = 1 and k_2 is the slope.

In the case of a bent cathode, by appplying the principles of field sectioning, we can imagine an insulating wall on the plane bisecting the bent cathode (Fig. 5). This gives us two Hull half-cells with 5-cm. instead of 10-cm. cathodes and with the angle formed by the cathode and the wall remaining at 39°. It follows, therefore, that the current distributions on the 5-cm. and 10-cm. lengths should be homologous. This is confirmed by experiment, the k_2 (slope) coefficients being the same in both equations, [1] and [2]. Moreover, by effecting the change of variable x = X/2, we obtain as first coefficient of Equation [2]:

$$k_1 = k_1 - k_2 \log 2$$
$$= 3.96 - 3.88 \times 0.3 = 2.80$$

Appendix III

Note. — Some details concerning the operating regularity of this installation may be indicated. The last rinse before chromium plating is a warm rinse (30°C.) containing 2.4 g./l. of H_2SO_4. In this way, the sulphuric acid dragged out is automatically compensated by drag-in and no addition of H_2SO_4 is usually necessary. It is, therefore, only necessary to compensate, for the chromic acid lost by drag-out and metal depletion. This regeneration is effected daily. The bath is tested in the cell every day and completely analyzed once a week. A total anode surface of 760 dm.^{2} (with anodes more widely spaced at the entrance of the tank than at the middle) in comparison with a cathode surface of 180 dm.^{2} helps to prevent any excessive formation of Cr^{+++}.

Discussion

In the discussion that followed the presentation of this paper, the author stated that he intended to make a further study on the C.P. of chromium plating baths on a bright-nickel plate, including the influence of various contents of Cr^{+++} and Fe.

Science for Electroplaters

4. Isotopes

By L. Serota

THE existence of forty radioelements of high atomic weight with different radioactive properties, presented a challenge to the accepted periodic arrangement of the elements. To satisfy the requirements of the periodic table it would be necessary for several of these forty radioelements to occupy the same space. This would imply that a number of these elements would have the same atomic number.

Evidence of such a condition was indicated in the changes that occurred to these radioelements as a result of the disintegration process. One effect of disintegration of the radioactive elements is loss in weight accompanied by change in atomic number. Another possible effect is change in atomic number only. These changes are due to the emission of alpha particles and beta particles from the nucleus of the radioactive element during the process of disintegration. Ejection of an alpha particle, which possesses a mass of four and a charge of plus two, would result in the formation of a lighter weight element with a new atomic number. This number would be two less than the atomic number of the previous element. The escape of a beta particle (electron) from the nucleus does not change the weight of the element; instead, the atomic number of the element is increased by one. Hence the process of decay of these radioelements results in a continuous change in weight and change in atomic number. The end product of decay of radioactive radium, for example, is a stable (not radioactive) form known as radium G with an atomic weight of 206. (Fig. 10.) This process of decay is known as nuclear transmutation. The product, radium G, has been shown to be a form of lead.

It is thus possible to have a number of radioelements with the same atomic number; that is, the same position in the periodic table. On this basis, seven radioelements possessing different radioactive properties but with the same atomic number 84 should fit into the same space in the periodic table occupied by the element polonium, mass 210, atomic number 84. The elements are radium A (218), radium C (214), radium F (210), actinium A (215), actinum C (211), thorium A (216), thorium C (212). If the atomic number for each of the seven elements is 84, then their chemical characteristics should be the same, even though the atomic weights are different. This was found to be the case for the seven elements just cited.

This view led to the proposal by Frederick Soddy, in 1913, that the term "isotope" (Greek, *iso* same, *topos* place) be used for elements with the same atomic number. The seven radioelements cited above are, therefore, classified as isotopes. A satisfactory explanation was thus advanced for the existence of a number of radioelements with the same chemical characteristics. The nuclei of the isotopes of the same element contain the same number of protons but different number of neutrons. The three isotopes of uranium, found in nature, atomic number 92, with atomic weights of 234, 235 and 238 respectively, would have the following nuclear arrangement.

$$U\ 234\text{-}92 = 142 \text{ neutrons } \begin{matrix}92p\\142n\end{matrix}$$

$$U\ 235\text{-}92 = 143 \text{ neutrons } \begin{matrix}92p\\143n\end{matrix}$$

$$U\ 238\text{-}92 = 146 \text{ neutrons } \begin{matrix}92p\\146n\end{matrix}$$

Uranium, found in nature, contains only .006% of the isotope U-234. The

Fig. 10

Successive Stages in the Process of Disintegration (decay) of Radium

Element	*Atomic Weight*	*Atomic Number*	*Nuclear Structure*	*Particle Emitted*	*Stability*
Radium A	218	84	84p 134n		
				an alpha particle escapes	unstable
Radium B	214	82	82p 132n		
				a beta particle escapes	unstable
Radium C	214	83	83p 131n		
				a beta particle escapes	unstable
Radium C′	214	84	84p 130n		
				an alpha particle escapes	unstable
Radium D	210	82	82p 126n		
				a beta particle escapes	unstable
Radium E	210	83	83p 127n		
				a beta particle escapes	unstable
Radium F (Polonium)	210	84	84p 126n		
				an alpha particle escapes	unstable
Radium G (lead)	206	82	82p 124n		
End Product				no particles emitted	stable

NOTE: The beginning of the disintegration of the elements of this series is believed to start with the element uranium which changes, after several stages of transformation, to radium.

amount of this isotope available is therefore negligible. Uranium-235, present to the extent of .72%, is important for this reason; if this isotope is bombarded by neutrons traveling at moderate speeds (controlled), the nucleus of the isotope will split into fragments. One effect of this disruption of the nucleus is the release of a tremendous amount of energy. This process is called fission.

The control of this nuclear reaction and the application of this atomic energy for military purposes was the objective of the United States Atomic Energy Commission project. The success of this scientific effort was dramatically brought to the attention of a startled world with the devastating explosive force of the atom bomb dropped over Hiroshima in August 1945. The energy that is released in the complete fission of 2.2 pounds of uranium-235 would be roughly equivalent to the energy released by twenty thousand tons of TNT. In terms of power, the fission of one gram of uranium-235 a day would produce one million watts. This conversion of mass into energy is expressed in the fundamental Einstein mass-energy equation $E = MC^2$, where E is the energy, M is mass, and C is speed of light (186,000 miles per second). This is the basic law for atomic energy. It represents the important relationship between energy and mass.

The impact of this stupendous scientific achievement has virtually created a new age, an atomic era, in the advancement of civilization. One of the most valuable and beneficial effects of the atomic energy project was the production, and availability, for experimental study, of various isotopes, both radioactive and stable (inactive) forms, of many elements, including the lighter weight elements. This development has provided a most important tool in the investigation of medical, biological and industrial problems. Since isotopes are chemically alike, the radioisotope can be detected by its radioactivity when mixed with an inactive (stable) isotope of the same element. Used in this manner it is known as a "tracer element" and its presence can be traced (detected), when included in a compound, or sometimes by its self, in chemical and physical changes. The Geiger-Muller counter is one of the instruments used in such studies.

A major advance in the method of production of these isotopes has been achieved by the United States Atomic Energy Commission. Since 1946 the commission has been producing radioisotopes in sufficient quantities to meet the needs of scientific study and educational programs. One method utilizes the improved nuclear reactors (atomic pile). Another method employs the separation of these isotopes from fission products. Some of the ways are: extraction using an organic solvent; precipitation with a stable isotope as a carrier; separation of the metals in solution by electroplating. The use of the cyclotron is another source for these tracer elements.

Application of Tracer Elements

Many of the perplexing problems relating to electroplating are being investigated by the use of this newest scientific tool. Virtually every phase of the industry is the subject of intensive study by this method. This is indicated by the nature and extent of related papers published in recent years. It was most effectively stressed by Dr. William Blum at a panel discussion at the 37th Annual American Electroplaters' Society Convention in 1950, when he stated "this application of radioactive tracers is a new tool, so new that we do not yet realize its possibilities."

The following examples of experimental investigation will illustrate this application; the use of radioactive isotopes for the determination of current and metal distribution in electrodeposition in an acid copper sulphate solution was the basis of study by J. Kronsbein. This bath was employed for the investigation because a study of primary current distribution can be made without interference from polarization. Radioactive copper-64 is obtained from ordinary copper by irradiation with neutrons in a nuclear reactor. A small amount of this radioisotope, when dissolved and added to the acid copper bath, will be codeposited with the stable copper isotope used in the bath solution. The amount of the radioactive and stable forms deposited will be in proportion to the quantities present in the solution. A Geiger counter was used to determine the metal distribution on the cathode. This served as the basis for calculating the current distribution.

Radioactive chromium-51 was used by F. Ogburn and A. Brenner to study the mechanism of electrodeposition in chromium plating. By tagging solution with this tracer, it was conclusively shown that the metallic chromium is deposited out of the bath from the hexavalent state.

For the development of metal cleaners, radioisotopic evaluation methods were employed by J. C. Harris and R. E. Kamp. The type of cleaning composition studied was of an alkaline nature and, in addition, contained effective surface active agents for improving the general cleaning characteristics. This method, using radioisotopic tracer compounds in metal cleaning, has been found to be not only quantitative in nature but more sensitive than previous methods employed. The soil used contained 1% n-undecane (hydrocarbon) tagged with radioisotope carbon-14. The result, using a 5% solution concentration, indicated that, for ease of removal, sodium meta- and orthosilicates were most effective. Trisodium phosphate, tetrasodium pyrophosphate, and soda ash were less effective, and caustic soda by this comparison was poor.

The use of radiobarium for determination of the sulfate concentration in a chromium bath was investigated by S. L. Eisler. The ratio of sulfate to that of the chromium trioxide in the solution, for maximum efficiency and smooth chromium deposit, requires a procedure that will be rapid and accurate. The gravimetric method in use at present is considered unreliable because of co-precipitation. Radiobarium 140, obtained in an HCl solution and used as a tracer, was added to the precipitant barium chloride. The determination, made by the counting (Geiger counter) technique, indicated better results could be obtained by this method.

Problems relating to the phosphating process were investigated by S. L. Eisler and P. G. Chamberlain. The method employed involved the application of radiometric techniques. The tracer, radioactive iron-59 in powder form, used in this investigation produced information that was not obtainable by normal chemical techniques. Results indicated the following: iron from the solution becomes an integral part of the phosphate coating; residual phosphate was present on work after grit- or sandblasting; rephosphating after grit- or sandblasting resulted in a lower process efficiency than after chemical removal of the original coating.

A metal cleaning test using radioactive stearic acid as soil was undertaken by J. W. Hansley, H. A. Skinner

and H. R. Suter. The extreme sensitivity of the radiotracer method is cited as an apparent advantage over such tests as waterbreak, fluorescence and plating trials. Additional distinctive advantages for this method are the rapid procedure and the precision of quantitative measurements of minute amounts of soil. Several different tagged isotopes can be used to study the removal of individual components of a mixed soil. A more versatile approach to the study of metal cleaning is thus made possible by this radioactive tracer method. The rate of soil removal by the process of immersion 90°C. without agitation was studied. Four common alkalies, tetrasodium pyrophosphate, trisodium phosphate, sodium metasilicate, and soda ash were used for the tests. The difference in the action of the four alkalies in the removal of the stearic acid film from steel was quite distinct for short periods. Soda ash for example left about ten times as much soil as did TSPP for a one minute immersion. The difference, however, becomes much less with increased cleaning time. The amount of soil remaining (residual soil) seemed to reach an equilibrium with each cleaning solution as the cleaning time was increased. Beyond ten minutes, continued cleaning had little or no effect.

Additional investigation by J. M. Hansley of metal cleaning by the radioactive tracer method, showed effectively that stearic acid, as soil, is removed by electrocleaning steel anodically at a faster rate from a compounded electrocleaner solution than from a sodium metasilicate solution.

A study was undertaken to evaluate a new stripping solution for phosphate coating employing radiometric methods. The stripping solution consisted of sodium hydroxide, 24 oz./gal., and sodium cyanide, 12 oz./gal. Another solution that was used contained, in addition to the two mentioned reagents, 12 oz./gal. of a sequestering agent (tetrasodium salt of ethylenediamine tetraacetic acid). The effect of the stripping solution on rephosphating efficiencies was also determined. The choice of a radiochemical technique was again stressed because of its extreme sensitivity in determining the efficiency of the coating removal process. Radiophosphorus 32, in the form of phosphoric acid, was used in the tests. It was shown that the presence of a sequestering agent in the stripping solution was effective in removing iron, zinc and manganese phosphate coatings. Results also indicated that no deleterious effects on the rephosphating efficiencies resulted from the use of this solution.

The examples cited are convincing proof of the application of the latest technological advances to the study of basic problems relating to electroplating.

Stable Isotopes

The presence of lead in uranium, noticed about 1907, prompted the suggestion that lead could be the end-product in the disintegration (decay) of radioactive uranium. Experimental evidence added further proof that the atomic weight, 206, of the isotopic form of lead derived from uranium, or radium, was not the same as the atomic weight 207.2 of lead from natural (nonradioactive) sources. This difference in weight for both leads having the same chemical properties provided an additional convincing step that lead from uranium must be the result of radioactive decay. It also gave additional support to the existence of isotopes. It was to be expected that this would lead to the belief that the other stable (nonradioactive) elements could consist of isotopes.

A development that gave support to this view was the study of positive (canal) rays. Positive rays form in a vacuum tube. When a high potential is applied, electrons from the cathode (cathode rays) collide with the gaseous molecules introduced in the tube. The result of this impact is the formation of a positively charged (ionized) particle that will move with increasing speed toward the cathode. If the cathode is perforated, these positive rays will pass through and can be detected on a photographic film.

J. J. Thomson found in 1912 that these rays could be bent or deflected by magnetic and electrical fields. The extent of deflections will depend upon the gas introduced in the tube, the strength of the electrical or magnetic fields, velocity of the positive rays and related factors. With neon in the tube, Thomson found that the positive ray lines on the photographic plate represented masses of 20 and 22 for neon. This seemed to be convincing evidence the neon, a stable element with an atomic weight of 20.2, was actually a mixture of two gases possessing atomic weights of 20 and 22. Later, investigators repeated this experiment with a better designed unit called the mass spectrograph. Aston, a pioneer in positive ray analysis, confirmed the values for the two atomic weights of neon obtained by Thomson. The isotopes of the stable element chlorine (35.47) with atomic weights of 35 and 37 were next determined. Here was ample proof that fractional atomic weights represented mixtures of isotopes with "whole number" weights. About 320 isotopic forms, including 40 of the radioactive isotopes, exist in nature. Of the complete list of elements, 21 are pure elements, the others have two or more isotopes. A list of some of the common nonradioactive elements is listed in the following table.

TABLE I

Isotopes Of Stable (nonradioactive) Elements

Element	*Atomic Number*	*Atomic Weight*	*Weight (mass) of Isotopes*
Hydrogen	1	1.008	1, 2, 3
Carbon	6	12.010	12, 13, 14
Oxygen	8	16.000	16, 17, 18
Fluorine	9	19.004	19
Sodium	11	22.997	23
Aluminum	13	26.989	27
Sulfur	16	32.066	32, 33, 34, 36
Chlorine	17	35.457	35, 37
Chromium	24	52.01	50, 52, 53, 54
Iron	26	55.85	54, 56, 57, 58
Cobalt	27	58.94	59
Nickel	28	58.69	58, 60, 61, 62, 64
Copper	29	63.54	63, 65
Zinc	30	65.38	64, 66, 67, 68, 70
Molybdenum	42	95.95	92, 94, 95, 96, 97, 98, 100
Silver	47	107.880	107, 109
Cadmium	48	112.41	106, 108, 110, 111, 112, 113, 114, 116
Gold	79	197.04	197

SHOP PROBLEMS

ABRASIVE METHODS SURFACE TREATMENTS CONTROL
ELECTROPLATING CLEANING PICKLING TESTING

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Pressure in Plating Barrels

Question: For some unknown reason the cover of our barrel plating cylinder blew off with a loud bang recently. We are zinc plating from a cyanide solution, using a 42" horizontal cylinder made of Lucite and perforated with 1/16" holes, so that we can handle some of our very small parts. I cannot see why sufficient pressure should build up, when the barrel is full of holes, to blow off the cover and hope you can explain.

F. W.

Answer: Blowing off is not so much due to pressure build-up as to accumulation of explosive hydrogen gas. The level of the solution is probably too low in the tank so that the cylinder has sufficient air space inside to permit accumulation of a large amount of hydrogen. With the level low, some of the parts are out of the solution, and an occasional spark between parts will set off an explosion, which blows off the cover. The panels are probably ½" thick which, with the small size of the perforations, results in solution retainment due to capillarity.

The condition can be avoided by maintaining the solution level as close to the top of the immersed cylinder as the gear construction will permit, and loading the cylinder with parts to about half the volume.

Cobalt-Iron-Nickel Bath

Question: Is it possible to deposit an alloy of cobalt, nickel and iron electrolytically? We are experimenting with an instrument on certain parts of which we would like a plating of this mixture because of certain desirable magnetic properties. Our librarian has looked through recent literature but has not been able to find anything on this subject. Therefore, we are writing you in the hope that your technical files might have something we missed.

H. P.

Answer: A patent was issued to R. M. Burns and assigned to Bell Telephone Labs on a method of depositing an alloy containing about 40% nickel, 35% iron and the balance cobalt (U.S. Pat. 1,920,964. Aug. 8, 1933). The following solution formula was disclosed:

Nickel sulfate	84	g./L.
Nickel chloride	12	"
Ferrous sulfate, cryst.	73	"
Ferrous chloride, cryst.	10.5	"
Cobalt sulfate	53	"
Cobalt chloride	7.5	"
Boric acid	25	"
Sodium sulfate	125	"

Temp. 50-60 deg. C., pH 4, current density 10 amp./sq. ft. The preferred anode is an alloy of iron and cobalt, with the nickel content replenished by additions of nickel hydroxide.

Use of Nickel Strike

Question: I understand some plating shops are using, besides an acid dip and cyanide dip, a nickel chloride dip on some metals before silver plating. In verifying this please advise the advantage, what metals, what nickel chloride formula, and in what dipping rotation.

L. V. T.

Answer: A nickel strike is generally used when silver plating knives to insure adhesion at the point where the handle meets the blade. It is also employed on nickel-silver flatware and holloware for the same purpose.

When using this strike, a cyanide dip is not necessary. After cleaning, rinsing and acid dipping, parts are treated in the nickel strike, rinsed and silver struck. The solution consists of 2 lbs. nickel chloride and 1 pint muriatic acid per gallon and is operated at room temperature and 6 volts direct current, using nickel or carbon anodes. Treatment time is ½-2 minutes.

Chromium Plating Crankshafts

Question: During the past few years there has been a general increase in the practice of chrome plating crankshafts. Is there any advantage to this practice, and what is the usual procedure in preparing a crankshaft for chrome plating?

J. P.

Answer: The advantage of chromium plating crankshafts is the increased wear possible due to the hardness of the chromium deposit and its low coefficient of friction. In addition, worn surfaces can be built up.

Preparation procedures will be found on pages 222-5 of the 1955 edition of the METAL FINISHING GUIDEBOOK.

Vitreous Enamel on Aluminum

Question: I understand that DuPont has a patent covering the application of vitreous enamels to aluminum alloys and if you happen to know the patent number I would appreciate that information.

C. F. C.

Answer: DuPont has a number of patents on the subject, among which are:

U. S.	2,467,114
	2,544,139
	2,642,364
	2,653,877
Br.	634,655

Acid Inhibitors

Question: Information is requested, if available, on the following and/or suppliers of the following: a) pickling inhibitors for use with acids to minimize attack on steel during removal of scale or rust; b) whether the above inhibitors are effective in

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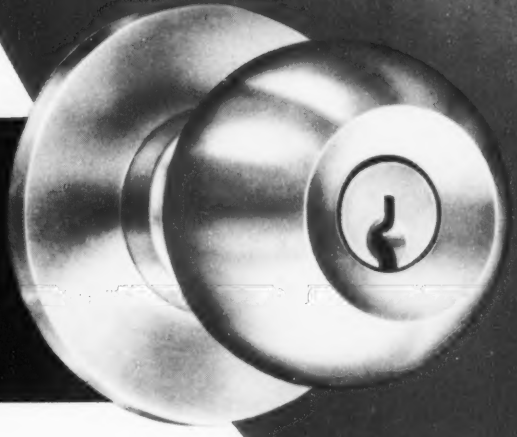

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Main Office and Laboratory:
42-48 27th Street, Long Island City 1, N. Y.

protecting steel and yet permit removal of zinc plating from the steel; and c) addition agents which reduce the surface tension of acid and alkaline pickling solutions and plating solutions.

R. C. C.

Answer: A list of suppliers of inhibited pickling acids and inhibitors will be found on page 550 of the 1955 edition of the METAL FINISHING GUIDEBOOK-DIRECTORY. Most of these suppliers also offer addition agents to reduce the surface tension in the pickling solution for the purpose of improving the pickling action and reducing acid spray.

These inhibitors are quite effective in protecting a steel base while stripping zinc plate. Other stripping methods will be found in the GUIDEBOOK.

Copper on Silicon

Question: Please advise me if there is a method of plating copper directly onto silicon metal.

W. V. B.

Answer: Our files show no references on any process for electroplating on silicon, directly with copper or any other metal. Coatings, however, can be applied to silicon by vacuum metallizing or by chemical precipitation in the form of a copper mirror.

Chromium Thickness Testing

Question: As you undoubtedly know, the American Water Works Association has recently issued a Tentative Specification C504-54T, covering rubber-seated butterfly valves. In this specification, they state:

"If requested by the purchaser, discs 20 inches in diameter, or less, may be provided with smooth, polished edges covered with a minimum of 0.003 inches of chromium plating extending over the disc for a distance of at least 1 inch from the outside circumference."

The problem is to find an instrument or method of accurately determining the thickness of the plate as received from the plater and polisher. Standard magnetic methods that we have tried do not prove satisfactory, which we assume is due to the semicircle shape and the varied magnetic density of the valve disc seating edge.

We are attaching one copy of our drawing A-122224, outlining a valve disc and indicating the shape of the area to be plated. This particular drawing is for a 20" disc, although valves are manufactured in sizes 4" to 48", utilizing similar disc construction.

It would be appreciated if you could give us any information relative to this problem.

A. E. H.

Answer: Magnetic methods of determining thickness of chromium are suitable on surfaces of the shape of your discs. The radius is sufficiently large so that this factor would not enter into the results.

It is necessary to prepare standard specimens plated on cast iron or Meehanite in order to calibrate the intrument. A different magnet is employed for heavy deposits than for thin ones and we would suggest that you communicate with the supplier of the instrument.

A list of manufacturers of non-destructive testers is enclosed.

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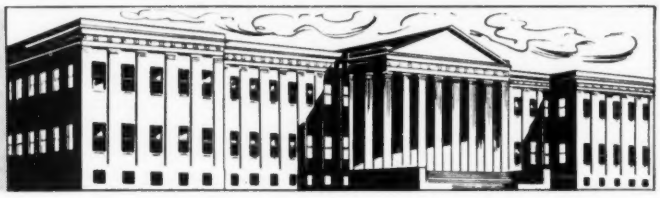
Patents

RECENTLY GRANTED PATENTS IN THE METAL FINISHING FIELD



Electroforming

U. S. Patent 2,691,144. *Oct.* 5, 1954. *C. H. Parsons and R. J. Perme, assignors to Fansteel Metallurgical Corp.*

An electroforming apparatus for rectifier discs, said apparatus comprising a plate having a number of recesses therein for accommodating one rectifier disc, the plate material at least around the recess being of electrically conductive material and providing an annular contacting and support region for one side of said disc at a peripheral portion thereof, means for electrically connecting the material around the various recesses to one common terminal, a second plate of insulating material, said second plate having apertures therethrough registering with the recesses in the first plate when said second plate is disposed in face to face relation to said first plate, a spring-pressed contactor disposed in each aperture in said second plate, said spring-pressed contactor having an annular contacting portion for engaging the other side of said disc at a peripheral portion thereof extending beyond a face of the second plate so that when the second plate is disposed against the said first plate in registering position, a spring-pressed contactor will engage a rectifier disc, means for connecting all of said spring-pressed contactors to a terminal and means for maintaining said two plates in tightly pressed relationship so that the spring-pressed contactors press against the contact discs whereby a number of rectifier discs may be electroformed.

Pickling Process

U. S. Patent 2,692,188. *Oct.* 19, 1954. *A. E. Chester and J. T. Irwin, said Chester assignor to Poor & Co.*

A process of conditioning ferrous metal surfaces which comprises immersing the ferrous metal surface to be conditioned in an acid pickling bath containing a water soluble ionizable thiocyanate and a compound capable of liberating elemental colloidal sulfur, the quantity of said last named compound being effective to liberate colloidal sulfur in a sufficiently small amount to remain dispersed in colloidal form.

Chemical Polishing Solution and Method

U. S. Patent 2,692,189. *Oct.* 19, 1954. *Bo-Shin Ro, assignor to Khe-Beng Chiong.*

The method of producing a high luster on a metal selected from the group consisting of carbon steel, special steel, aluminum, and aluminum alloys, which consists of immersing said metal in an anhydrous bath at a temperature of 120°C. to 260°C. for a period of time less than 60 seconds, said bath consisting of an acid selected from the group consisting of metaphosphoric acid and pyrophosphoric acid and at least one substance selected from the group consisting of tartaric acid, oxalic acid, ferrous sulphate and sulfuric acid.

Non-Tarnishing Copper Cleaner

U. S. Patent 2,692,236. *Oct.* 19, 1954. *W. W. Sweet and W. J. Mead, assignors to Colgate-Palmolive Co.*

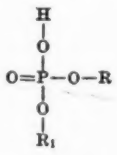
A detergent composition normally tending in water solution to cause tarnishing of a copper base alloy consisting essentially of water-soluble inorganic polyphosphate salt, and having incorporated therein a small amount of di-butyl thiourea sufficient to inhibit said tarnishing.

A detergent composition in accordance with claim 1 which contains about 10 to about 50% of water-soluble organic detergent selected from the group consisting of the water-soluble organic sulfate, sulfonate and nonionic detergents.

Conversion Coating

U. S. Patent 2,692,840. *Oct.* 26, 1954. *E. P. Bell, assignor to Parker Rust Proof Co.*

A chemical composition for the primary treatment of the surfaces of metals of the group consisting of steel, zinc and aluminum consisting essentially of 2%-16% basic zinc chromate; 2%-16% of at least one resin selected from the group consisting of polyvinyl butyral, alkyd resins and polyamide resins, a suitable solvent therefor and 2%-20% of phosphate of the following structure:



wherein R is selected from the group of radicals consisting of hydrogen, ammonium and substituted ammonium and R_1 is selected from the group consisting of ammonium and substituted ammonium, the pH of said composition being from 6 to 9.

The method of forming a relatively thin coating as a paint base on a metal of the group consisting of steel, zinc and aluminum, said method comprising the steps of contacting the surface of said metal with 2%-16% basic zinc chromate, 2%-16% of at least one resin selected from the group consisting of polyvinyl butyral, alkyd resins and polyamide resins, a suitable solvent for said resin and 2%-20% of a phosphate selected from the group consisting of diammonium phosphate, guanylurea phosphate, dimorpholine phosphate, ditrimethyl ammonium phosphate, said composition having a pH between 6 and 9, to form a film having a thickness between 0.1 and 0.8 mil by reaction between the said base metal and the said composition, and subsequently drying the reaction product film.

Abrasive Blasting

U. S. Patent 2,692,458. *Oct.* 26, 1954. *E. E. Lawrence, assignor to United States Steel Corp.*

Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and

end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers.

Recirculation of Waste Pickle Liquor

U. S. Patent 2,697,050. *Dec.* 14, 1954. *R. R. Barnes, assignor to Bethlehem Steel Co.*

A process for the pickling of metal continuously passing through a longitudinally disposed pickling bath, comprising the heating of and the energizing-for-flow of the pickling solution of said pickling bath in its entirety for continuous unidirectional cyclical recirculation through said bath and through bath terminals interconnecting return conduit therefor, thereby effecting uniform heating of said pickling solution and repetitively immersed contact thereof with said metal.

Analysis of Hypophosphite

U. S. Patent 2,697,651. *Dec.* 21, 1954. *G. Gutzeit, assignor to General American Transportation Corp.*

The method of determining the hypophosphite content of a sample solution comprising producing a test solution; wherein 100 cc. of said test solution essentially comprises approximately 5 cc. of a boric acid stock solution, approximately 5 cc. of a sodium sulfite stock solution, approximately 5 cc. of a molybdic acid-sulfuric acid solution, an aliquot of said sample solution appropriate to bring the hypophosphite content of said test solution down into a predetermined range of approximately 1 to 7 parts of hypophosphite per 1,000,000 parts of said test solution by weight, and the balance water; wherein said boric acid stock solution contains about 5 gms. of boric acid per 100 cc. of water, said sodium sulfite stock solution contains about 5 gms. of sodium sulfite per 250 cc. of water, said molybdic

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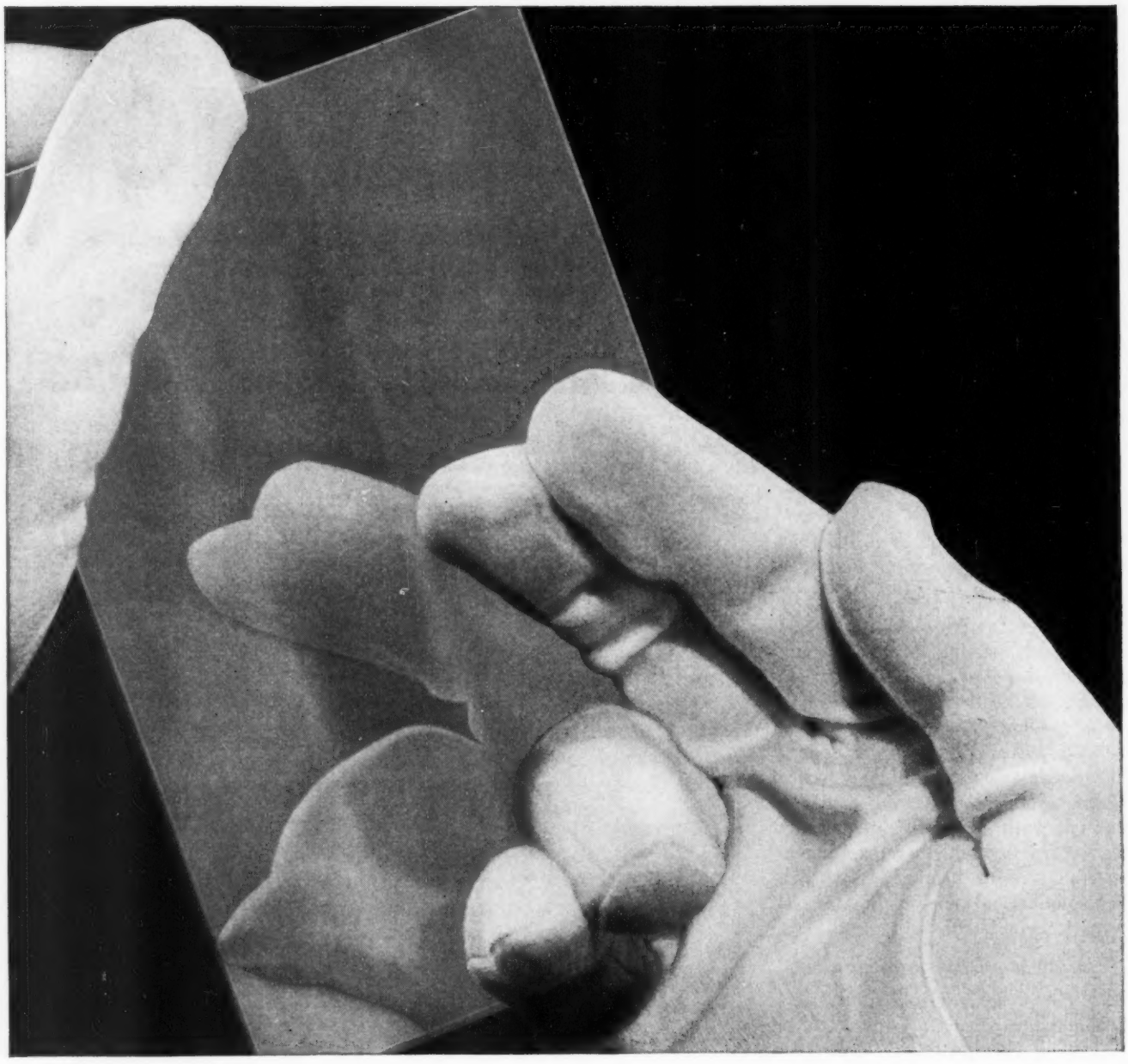

White glove test proves K-8 cleans deep—removes smut

SMUT KEEPS REJECTS HIGH in many plating shops. But the toughest impacted soils and smut are no match for new Pennsalt Electrocleaner K-8. Where other cleaners fail, K-8 gives consistently brilliant results—cuts rejects to the bone, eliminates costly extra buffing, prevents roughness and dulling of the plate.

Pennsalt Electrocleaner K-8 is a highly conductive alkaline detergent; it lets maximum current flow at economical voltages. Here is a new concept of *synergistic* surface-active agents that work equally well on steel or copper.

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Contact your local distributor directly, or write: Metal Processing Department, Pennsylvania Salt Mfg. Co., 1110 Widener Bldg., Philadelphia 7, Pa.

Pennsalt Chemicals

acid-sulfuric acid solution contains in approximately 100 cc. thereof about 50 cc. of a molybdic acid stock solution and about 12½ cc. of concentrated sulfuric acid and the balance water, and said molybdic acid stock solution contains in approximately 200 cc. thereof about 20 gms. of molybdic acid and about 25 cc. of 20% sodium hydroxide and the balance water; heating said test solution at a temperature of about 50°C. for a time interval of about 30 minutes to obtain a molybdenum-blue reaction therein; and measuring the light transmission characteristic of the blue coloration of said test solution to obtain an index of the hypophosphite content thereof within said predetermined range.

Aluminum Electroforming

U. S. Patent 2,692,850. *Oct.* 26, 1954. *W. H. Safranek, W. C. Schickner and C. L. Faust, assignors to The Battelle Development Corp.*

The method of electroforming a thick, dense aluminum article which comprises the steps of forming an electrically conductive base in a desired configuration, immersing said article in a bath, said bath comprising a solution of a liquid aromatic hydrocarbon solvent in which is dissolved an organic additive selected from the group consisting of methyl tert-butyl ether, ethyl ether, and diphenyl oxide, in an amount sufficient to achieve said thickness and density, and a fusion of an aluminum halide and a quaternary salt of nitrogen, said solvent being present in sufficient quantity to form a layer of excess solvent, continuously dispersing said excess solvent throughout the bath, passing an electric current between an aluminum anode and said conductive base as a cathode until an aluminum coating is deposited thereon, removing said coated base from the bath, and separating said conductive base from said aluminum coating.

Hard Anodizing Aluminum

U. S. Patent 2,692,851. *Oct.* 26, 1954. *C. F. Burrows, assignor to Aluminum Co. of America.*

A method of producing a hard, abrasion-resistant anodic coating on the surface of a predominantly aluminum or aluminum alloy article by making the article to be coated an anode in an electrolytic cell containing an aqueous acidic coating-forming electrolyte comprising predominantly an aqueous solution of sulfuric acid and passing an electric current through the electrolytic cell, including the anode, while maintaining the electrolyte at a temperature below 35°F. during the entire coating operation.

Hard Anodizing Aluminum

U. S. Patent 2,692,852. *Oct.* 26, 1954. *C. F. Burrows, assignor to Aluminum Co. of America.*

A method of forming a hard, abrasion-resistant anodic coating on a predominantly aluminum surface by subjecting it to anodic oxidation while in contact with an aqueous acidic coating-forming electrolyte maintained at a temperature below 40°F. but above the freezing point of the electrolyte, said electrolyte being at least substantially saturated with CO_2 during the entire coating operation.

Electropolishing

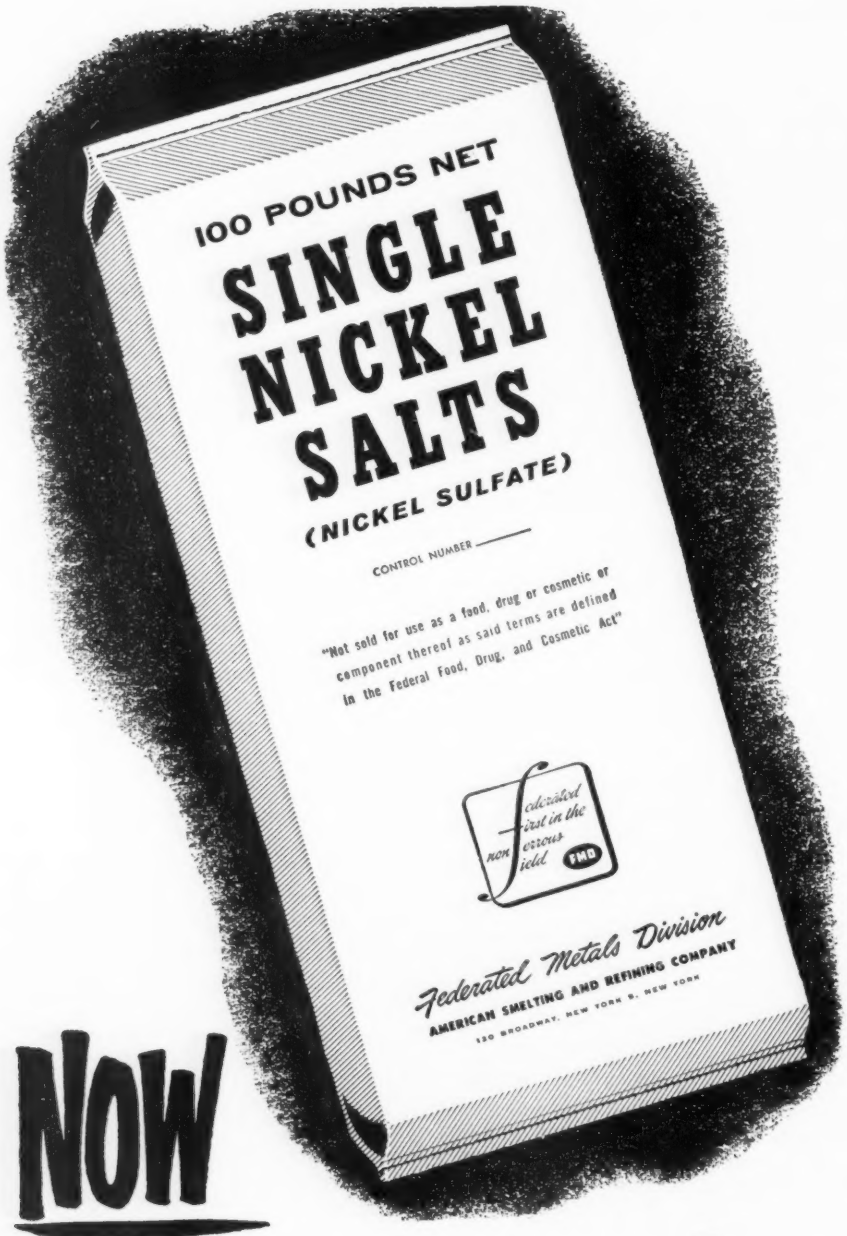
U. S. Patent 2,692,853. *Oct.* 26, 1954. *T. S. Gamble, assignor to Shawinigan Chemicals, Ltd.*

An electrolyte for use in the electrolytic polishing of stainless iron and steel articles wherein the article is employed as an anode, said electrolyte consisting essentially of an acid of the group consisting of sulfuric and orthophosphoric acids and mixtures thereof, water, and an amount of a material of the group consisting of humic acid and alkaline salts of humic acid effective to produce a bright polish over a wider range of acid concentration, temperature, and current density than in the absence of the member of said group.

Electroless Nickel

U. S. Patent 2,694,019. *Nov.* 9, 1954. *G. Gutzeit, assignor to General American Transportation Corp.*

The process of chemically plating with nickel a solid body essentially comprising an element selected from the group consisting of copper, silver, gold, aluminum, iron, cobalt, nickel, palladium and platinum, which comprises contacting said body with a bath consisting essentially of an aqueous solution of a nickel salt and a hypophosphite and a salt of a simple short chain saturated aliphatic dicarboxylic acid and a fluoride, wherein the absolute concentration of fluoride ions in said bath expressed in mole/liter is between 0.01 and 0.12.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Bright Dip for Stainless Steel

U. S. Patent 2,694,001. *Nov.* 9, 1954. *S. C. Hayes and J. T. Lomakin, assignors to Armco Steel Corp.*

In polishing a stainless steel product comprising chromium, nickel, and carbon in which the chromium content amounts to about 10% to 35% and remainder substantially iron, the art which comprises, immersing the product to be polished in a bath essentially consisting of by volume about 2% to 8% nitric acid, 4% to 15% hydrochloric acid, 2% to 12% hydrofluoric acid, 3% to 18% sulphuric acid, and the remainder substantially water together with at least one organic compound of the alkaloid class amounting to about 0.05% to 6% by weight of bath for sufficient time and at such temperature as to achieve a polishing of the product.

Electroless Nickel

U. S. Patent 2,694,017. *Nov.* 9, 1954. *R. R. Reschan and A. Krieg, assignors to General American Transportation Corp.*

The process of chemically plating with nickel a body essentially formed of a material selected from the group consisting of aluminum and its alloys, which comprises contacting said body with a bath consisting essentially of an aqueous solution of a nickel salt and a hypophosphite and a nitrate, wherein the absolute concentration of nitrate anions in said bath expressed in mole/liter is between 0.15 and 0.50.

Bright Nickel

U. S. Patent 2,694,041. *Nov.* 9, 1954. *H. Brown, assignor to The Udylite Corp.*

A bath for electrodepositing lustrous nickel comprising an aqueous acidic solution consisting essentially of an electrolyte selected from the group consisting of nickel sulfate, nickel chloride and a mixture of nickel sulfate and nickel chloride in the presence of 0.5 to 3.0 grams/liter of coumarin sulfonic acid.

Brushing Machine

U. S. Patent 2,694,274. *Nov.* 16, 1954. *A. S. McGibbon, assignor to Lukens Steel Co.*

Apparatus for the surface finishing of a work piece comprising: a rotatable brush adapted to engage the sur-

face of the work piece, the brush having a shaft; a supporting frame for the brush; a pair of arms pivotally connected with the frame, each arm having bearing means for rotatably supporting the shaft of said brush; mechanism for vertically adjusting the brush including a rotatable crank connected with the frame, a fluid pressure cylinder and piston, one of last said elements being connected with the crank and the other with one of said arms; and mechanism for rotating the brush and for oscillating the brush along its axis of rotation including a drive pulley having spline connections with the brush shaft and means to move the shaft relatively axially of the pulley.

System of Gas Plating

U. S. Patent 2,694,377. *Nov.* 16, 1954. *P. Pawlyk, assignor to The Commonwealth Engineering Co.*

In a gas plating system for the deposition of copper oxides on heat insulating material the structure comprising a plating chamber having a wall, rack means within said chamber extending the length thereof to support an object therein whereby said object is insulated from heat transmitted through the wall of said chamber, to support an object in said chamber in heat insulated relation with the wall thereof, means to measure the temperature of the atmosphere in said chamber at a point remote from said rack means, and means to supply a flow of heated plating gas between said rack means and said temperature measuring means at substantially atmospheric pressure.

Pickling Ferrous Metals

U. S. Patent 2,694,657. *Nov.* 16, 1954. *N. H. Brundin, assignor to Ekstrand & Tholand, Inc.*

A process of pickling a ferrous metal, which comprises subjecting the surfaces to be pickled of the metal, at a pickling temperature, to the pickling action of an aqueous solution containing as the pickling agent a pickling concentration of ammonium bisulfate.

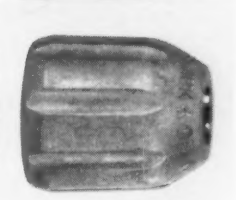
Bright Copper Plating Bath

U. S. Patent 2,694,677. *Nov.* 16, 1954. *B. D. Ostrow.*

A bright copper plating bath consisting essentially of an alkaline aqueous copper cyanide solution contain-

now you can get this brilliant finish directly on zinc die castings!

No electroplating--no mechanical finishing!



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NEW IRIDITE® (Cast-Zinc-Brite)

brightens zinc die castings by chemical polishing, protects against corrosion

NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for FREE PROCESSING for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. *IMPORTANT: when you give us samples for test processing, please be sure to identify the alloy used.*

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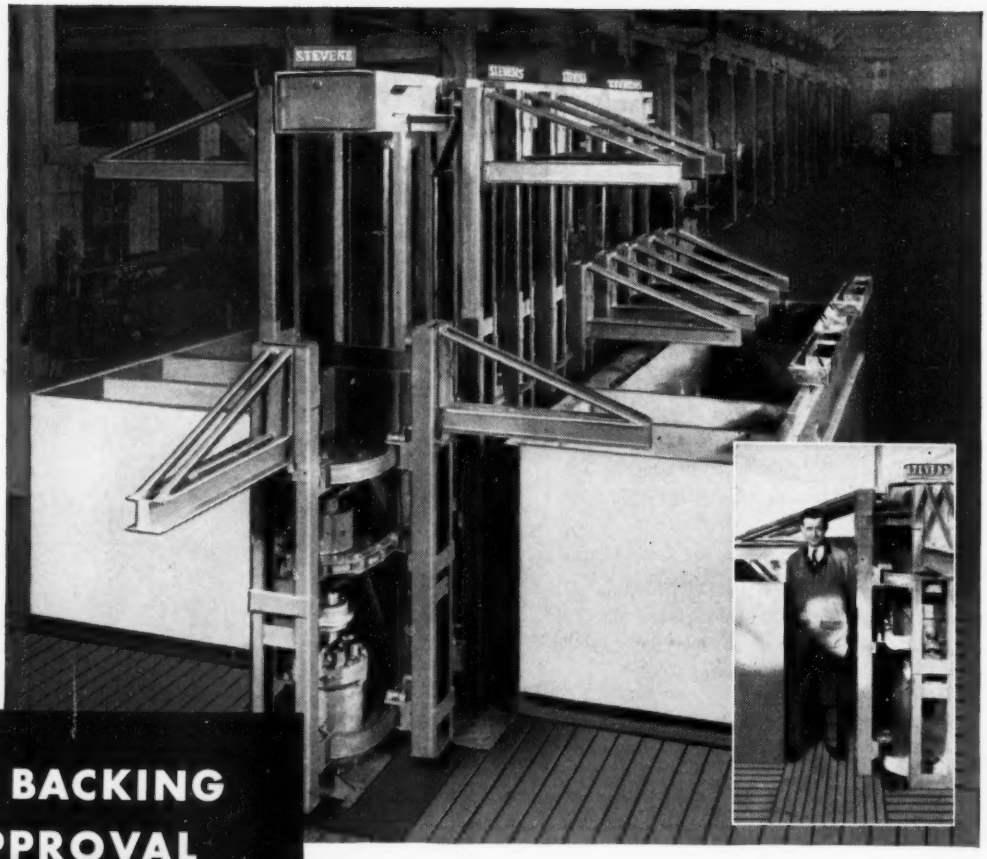

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Discriminating metal finishing experts who have viewed it in operation are strong in their approval of the "Stevadoer," new automatic plating and processing machine by Stevens . . . and they are backing up their approval with orders.

The "Stevadoer" is all that its name implies – strong, rugged, with smooth vertical and horizontal movement. In addition it provides unlimited lift and heavy load capacity.

The side-arm design, pioneered by Stevens, which eliminates operating mechanism over solutions, still provides for delayed set-down mechanisms and skip tracks.

You'll like the featured "built-in" safety cat walk that can be provided between the processing tanks and the mechanism on two-row machines, making anode servicing and tank or mechanical inspection an easy matter.

The new Stevens Stev-O-Matic automatic loader and unloader working with the new "Stevadoer" offers the last word in automation.

Write today for more information on this remarkable new machine for metal finishing.

See another new Stevens engineering triumph . . . the new "Little Steve" Automatic Plating Machine at the 4th Industrial Finishing Exposition – Booth 112, Public Auditorium – June 20 to 23, Cleveland, Ohio.

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Metal Finishing equipment and supplies from castings or stampings to finished product.

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ing at least .005 gram per liter of selenium in the form of a soluble selenophenol wherein the valence of the selenium is minus 2.

Electropolishing

U. S. Patent 2,694,678. *Nov.* 16, 1954. *H. G. McLeod and C. J. Wernlund, assignors to E. I. du Pont de Nemours & Co.*

In a process for electropolishing steel, copper and brass in which a metal article to be polished is made an electrode, the step comprising passing current through a substantially anhydrous electrolyte composed essentially of a nitrogeneous base selected from the group consisting of alkyl amines having from 1 to 5 carbon atoms per alkyl group, cyclohexyl amine, pyridine, pyrrolidine and morpholine, aromatic amines having the formula

where R is an aromatic hydrocarbon radical having a single benzene ring and X is hydrogen or an alkyl radical having from 1 to 5 carbon atoms, and a carboxylic acid which melts below 100°C. there being 1½ to 4 moles of acid for each mole of base.

Wire Plating Machine

U. S. Patent 2,695,269. *Nov.* 23, 1954. *A. E. E. De Witz and F. P. Roy, assignors to United States Steel Corp.*

Apparatus for electroplating stock of indefinite length, comprising an elongated tank having side and bottom walls adapted to contain electrolyte, a plurality of anodes in the form of flat shallow boxes of metal insoluble in said electrolyte having side, top and bottom walls, said anodes being disposed horizontally end-to-end and in spaced relation along said tank, means supporting said anodes with their top walls in a common plane below the top of said tank side walls, said anode top walls having a multiplicity of nozzle ports distributed thereover, an electrolyte-supply pipe connected to a wall of each anode other than the top wall and extending through a wall of said tank, said pipe and said anode being electrically insulated from said tank, a current-supply connection secured to each pipe externally of said tank, and cathode contacts spaced from each end of said anodes adapted to engage said stock from above.

Silver Firing Paint

U. S. Patent 2,695,275. *Nov.* 23, 1954. *R. B. Gray, assignor to Erie Resistor Corp.*

A water base paint for producing a film having good electrical conductivity before drying and reducible by firing after drying to a metallic silver film comprising a finely divided metallic silver pigment, a vehicle of polyvinyl alcohol, water, and an antifoaming agent.

Porcelain Enameling

U. S. Patent 2,695,249. *Nov.* 23, 1954. *B. J. Sweo and L. L. Moss, assignors to Ferro Corp.*

In the method of porcelain enameling a cleaned and roughened steel work piece surface having deep sharp edged pits therein, the steps comprising immersing said roughened work piece in an aqueous solution of a nickel salt and depositing from about 0.1 to about 0.2 gram per square foot of nickel thereon by the hypophophite reduction process, wherein there is no ion exchange between the work piece and said solution, applying thereto a finish coat porcelain enamel clay-free hydrous slip said porcelain enamel being substantially free of adherence promoting oxides, said slip further characterized by the inclusion therein of from about 0.001% to about 3.0% per 100 parts of frit of a synthetic organic cationic surface active agent and finally firing said porcelain enamel onto said work piece.

Chromium Bath

U. S. Patent 2,693,444. *Nov.* 2, 1954. *C. A. Snavely, C. L. Faust and J. E. Bride, Assignors to The Battelle Development Corp.*

The method of electrodepositing a coating containing chromium which comprises making an article to be coated the cathode in an aqueous solution, said solution consisting essentially of from 200 g./l. to saturation of chromium ammonium sulfate, from 10 to 200 g./l. magnesium sulfate, from 25 to 175 g./l. ammonium sulfate, from 0.001 to 1.0 g./l. sodium sulfite, the ions of at least one metal selected from the group consisting of iron, nickel, zinc, tungsten, molybdenum and cobalt, and the balance water.

THE FINISHING TOUCH

FINISHING OF ALUMINUM AND ZINC BASE DIE CASTINGS

by D. J. Swaninger
Sales Manager—Stevens Compositions

Each year, during the past decade, the use of zinc base and aluminum die castings has been on the ascendancy. Increased uses have been particularly noted in the automotive, aircraft, appliance, plumbing and radio-television industries.

New finishing techniques have played no small part in the rapid up-surge of die castings usage. The fine detail obtainable makes die castings ideal for decorative hardware and trim.

There are many finishing methods for aluminum or zinc base die castings. The choice is dependent upon final use of the individual part or product.

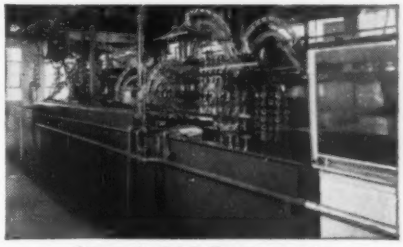
Typical die cast buffing operation on Stevens lathe.

For aluminum there is polishing, buffing, coloring, scratch-brushing, satin finishing, tumbling, etching, anodizing, bright dipping and electroplating.

For zinc polishing, buffing, tumbling and electroplating methods are used.

Which is best for you? Which will give the finish needed to make your product more saleable at the lowest cost to you?

Frederic B. Stevens, Inc., with their years of experience, can recommend the correct finishing procedure and furnish the equipment and supplies needed for the finishing of aluminum or zinc base die castings. Whether it is chemicals,



Stevens Model B Copper, Nickel, Chrome Die Cast Plating Machine.

compositions, lathes, automatic polishing equipment, Roto-Finish equipment or completely automatic electroplating and finishing machines, Stevens has it.

Perhaps we can help you with a Stevens L. V.* report. Write us on your company letterhead describing your product, the finish desired and required production.

*Laboratory Verified.

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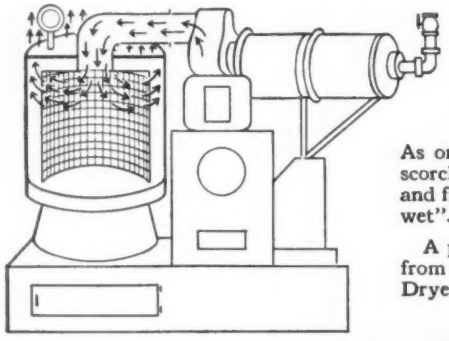
EVER BLOW INTO AN ASH TRAY?

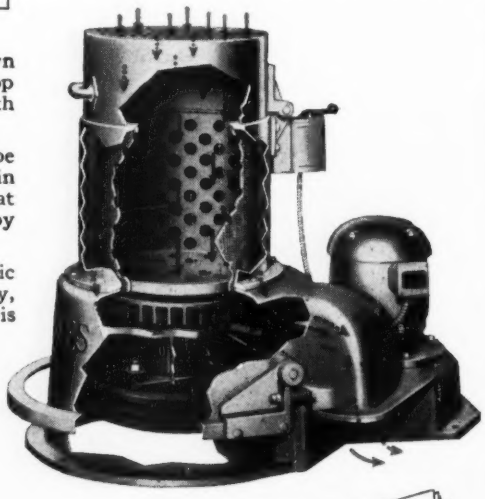


If you did, you saw a practical demonstration of the principle of air deflection. In old type dryers, air *blown* in from the top is deflected by the top layer of parts. As one user put it, "the top layer gets scorched, the next layer is nice and dry, and from there on down the parts are still wet".

A powerful suction fan *draws* the air from the bottom of the modern Nobles Dryer. Fresh air rushes in from the top to fill the vacuum and is drawn through the entire contents from top to bottom where it is expelled with the water.

Steam or electric heaters may be mounted compactly in the cover in contrast with space consuming, heat wasting, separate units connected by pipe.

An internal expanding, hydraulic brake stops the machine smoothly, and quickly. The "brake pedal" is a ring extending around the entire working area so that the machine can be stopped instantly from any working position. In the interest of faster drying and lower costs write today!



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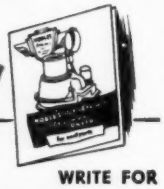

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maintaining the temperature of the solution between 135° and 160°F., and passing an electric current of from 100 to 500 amp./sq. ft. therethrough between an anode and said cathode.

Polishing Abrasive

U. S. Patent 2,694,004. *Nov.* 9, 1954. *W. W. Coffeen, assignor to Metal & Thermit Corp.*

A polishing material consisting of zirconium silicate in a state of subdivision such that at least 40% by weight of the particles lie within the range of 1 to 4 microns in average diameter, not more than 40% being below 1 micron in average diameter, not more than 70% being below 2 microns, not more than 30% being in the range of 4 to 10 microns, and none being above 10 microns.

Heater for Vacuum Metallizing Apparatus

U. S. Patent 2,693,521. *Nov.* 2, 1954. *P. Alexander, assignor to Alexander Vacuum Research, Inc.*

Apparatus for evaporating metal in vacuum which comprises a circuit having in series therewith an elongated conductor of greater resistance than said circuit, said conductor having end portions and a central portion of relatively large cross section and intermediate portions, one thereof being between one of said end portions and said central portion, and the other thereof between said central portion and the other of said end portions, said intermediate portions being of relatively small cross section, said central portions constituting a crucible and said intermediate portions constituting runways for molten metal flowing from said crucible; and a coating of material wettable by molten metal, said coating covering at least part of the inside of said crucible and extending therefrom along said runways.

Carriage for Removing Articles from a Galvanizing Bath

U. S. Patent 2,695,594. *Nov.* 30, 1954. *A. J. B. Fairburn, assignor to U. S. Steel Corp.*

In a carriage for removing elongated articles from a galvanizing bath, said carriage including magnetic means adapted to hold the articles and bottom and side guide plates extending beyond said magnetic means for receiving the articles, the combination with said bottom guide plate of a member carried above the upper face thereof to support the end portions of articles received within the space bounded by said guide plates, and means to heat said member to avoid cooling the coating on the articles.

Dust Filter

U. S. Patent 2,695,681. *Nov.* 30, 1954. *G. A. Boesger, assignor to The W. W. Sly Mfg. Co.*

In a dust filter of the type in which clean air is caused to flow reversely through the filter screens periodically for dislodging dust adhering thereto, a series of bags disposed in parallel spaced relation, means for causing dust laden air to flow normally from the outside to the inside of each bag toward a clean air discharge, whereby the dust is deposited on the external surfaces of the bag, an internal spacing means for each bag comprising a wire frame adapted to fit within the bag and prevent collapse thereof during the normal filtering operation, external spacing means between bags comprising wire elements to hold the bag walls against ballooning outwardly when the direction of air flow therethrough is reversed, said external spacing means between adjacent bags comprising a series of independent spaced vertical elements supported at their upper ends and held thereby against movement about a vertical axis, each of said elements having side members disposed relative to each

other in a plane at right angles to the bag walls, said side members of each element meeting and secured together at intervals throughout the length of the element.

Rust Preventive Compositions

U. S. Patent 2,695,848. *Nov.* 30, 1954. *J. W. Bishop, assignor to Tide Water Associated Oil Co.*

A substantially non-aqueous composition, adapted for inhibiting rusting of metal surfaces, comprising a major amount by weight based on said composition of a substantially non-corrosive vehicle and a small amount, sufficient to impart rust-preventive characteristics to said composition, of a rust-inhibiting alkylol-containing amine having an alkylol group esterified with a sulfonic acid.

Electrolytic Polishing Method

U. S. Patent 2,695,872. *Nov.* 30, 1954. *R. H. Espy, assignor to Armco Steel Corp.*

In the controlled polishing of a stainless steel product to achieve uniform rate of metal removal the art which comprises; immersing the product to be polished and an electrode substantially containing tantalum in an aqueous electrolytic polishing bath consisting essentially of aliphatic carboxylic acid and sulfuric acid; making the stainless steel product and said electrode the opposing terminals of the electrolytic bath; and supplying alternating current to the bath terminals for polishing the steel.

Method of Electroplating

U. S. Patent 2,696,466. *Dec.* 7, 1954. *J. F. Beaver, Jr.*

A method of electroplating irregularly shaped objects, including the steps of immersing the object to be plated in an electrolytic bath, further inserting in the bath at least two anodes, one of said anodes constituting an auxiliary anode and being placed in a recessed area of the object, another of said anodes constituting the main anode and placed outside of the object spaced from said auxiliary anode and with the said auxiliary anode being positioned between the object and said main anode, connecting said anodes to a source of current on the positive side, connecting said object to the current source on the negative side, applying current through the circuit so established for a determined time interval, interrupting current flow, disconnecting said object from the current source, reversing the electrical connection of said main anode from the positive side to the negative side while maintaining the connection of said auxiliary anode to the positive side, and applying current through the circuit so established for a second determined time interval.

Hot Galvanizing

U. S. Patent 2,696,446. *Dec.* 7, 1954. *W. S. Pearson, assignor to Clifton Conduit Co., Inc.*

In a method of galvanizing pipe wherein pipe having a zinc coating in a fluent condition thereon is handled by a conveyor roll, the improvement which comprises, spraying continuous surface portions of said roll with a carbonizable fluid material and heating the roll sufficiently to carbonize the said material prior to engaging said pipe by said continuous surface portions of said roll successively.

Descaling Titanium

U. S. Patent 2,697,051. *Dec.* 14, 1954. *S. Mellgren, L. Harbor and O. W. Moles, assignors to National Lead Co.*

A process for removing adherent scale from a titanium metal surface which comprises treating said surface with a molten alkali metal polysulfide until said scale is loosened from said surface and removing said polysulfide and said loosened scale from said surface.

GOOD PLATING IS **VITAL!**

MEAKER

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ABSTRACTS

Platinum Plating

H. L. Grube: *Metalloberflaeche.* Vol. 5, No. 4, p. B61.

A bewildering number of platinum plating baths have been proposed of which very few have proved practical. The commercial platinum plating baths can be grouped into two main types. These baths can be operated without serious difficulty and require no great expert knowledge on the part of the plater. The well known phosphate bath works satisfactory and is prepared as follows. In 500 cc. of distilled water there are dissolved: 100 g. crystalline disodium phosphate, 20 g. diammonium phosphate and 25 g. ammonium chloride. To this there are added 7.5 g. platinum chloride (40% Pt.) which has been previously dissolved in a little water. The complete solution is then vigorously boiled and, after cooling, is reacted with 10 cc. of concentrated ammonia and made up to a liter. This bath is operated at 70° to 80°C. with a current density of about 0.5 amp./sq. dm. The ammonia which is volatilized by the relatively high bath temperature must be replaced from time to time. By the addition of platinum chloride solution and boiling, a bath which has become impoverished in platinum can be regenerated. With correct pretreatment of the ware, the deposits from this bath are adherent and brilliant. According to the temperature and current density, the current efficiency varies from 10 to over 50%. If an impoverished phosphate bath has again been enriched with the addition of platinum chloride then the plate can possibly be deposited matt. This is an indication that a new bath must be made up because the chloride ions have become too concentrated.

The dinitrodiamminoplatinum bath prevents this enrichment in chloride ions in the bath. A suitable bath composition is: 15-20 g. dinitrodiamminoplatinum (60% Pt.); 100 g. ammonium nitrate; 10 g. sodium nitrite and 50 cc. concentrated ammonia which are dissolved in 1 liter of water. The complex platinum salt goes into solution as tetrammine platinum nitrite only after the addition of the ammonia. This bath works exceptionally well

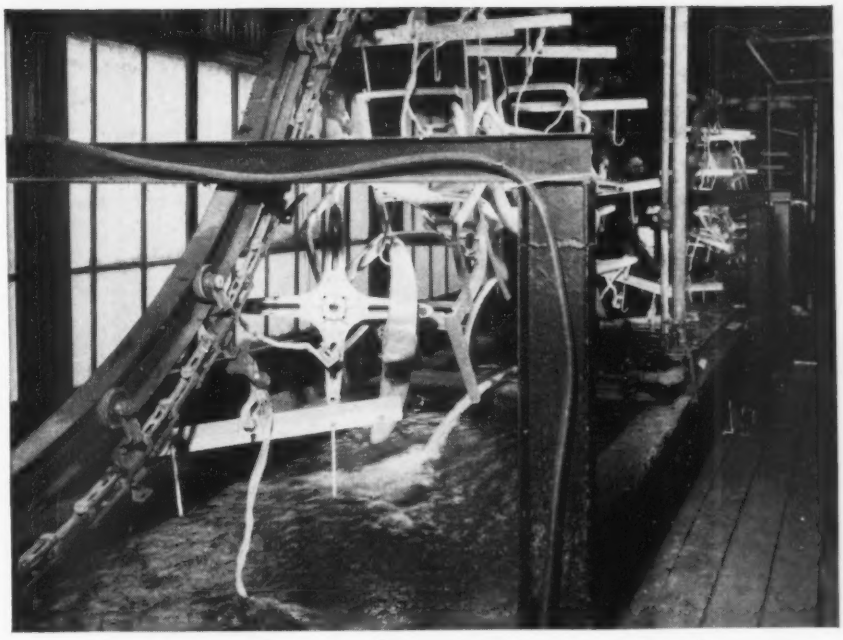
at 95°C. Volatilized ammonia must be replaced regularly. It is possible also to deposit a thick brilliant plate in one working stage while, with the phosphate platinum baths, at the most after plating for 15 minutes, the deposit must be treated before plating further. An advantage of the amine bath is that the impoverished bath can be regenerated many times by the addition of dinitrodiammino platinum before a freshly made up bath must be prepared. The current efficiency is low but, as platinum plating is a very expensive operation because of the high cost of the metal, this does not matter. Because of the high ammonia content of the bath, it is advisable in the case of copper and copper-rich alloys to apply a light silver flash before platinum plating. Care must be exercised that no cyanide is dragged into the bath.

Pickling Magnesium Alloys

H. K.: *Beiztechnik*. Vol. I, No. 6, p. 87.

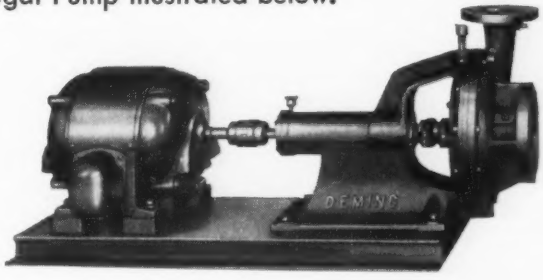
The removal of dirt, oil, grease, etc., is best undertaken by lengthy immersion in hot caustic alkalies and the degreasing stage is effected by carbon tetrachloride, tri- or perchlorethylene, benzene-petrol mixtures, etc. An important stage in the processing is the pickling. Its purpose is not only to remove any surface impurities but also to achieve a uniform surface condition and so to ensure the prior conditions necessary to obtain effective surface protection.

A suitable pickling solution for the purpose is nitric acid-alkali dichromate with about 15% sodium or potassium dichromate and 15 to 20% nitric acid in which the magnesium parts are immersed for only a short time (about one quarter to 1 minute) with constant agitation. After this there follows a thorough rinsing in flowing water while the drying is accelerated by a short immersion in warm water. The pickling produces on the magnesium parts a brassy-yellow coloration and the chemical resistance of the material is also appreciably improved by the pickling. In addition, the pickle serve to roughen the metal surface moderately and this favors the adhesion of any subsequent lacquer coating. As a rule, sheet and cast parts are pickled but never stamped parts, profiles and tubes. If the parts are to



Operation "Rinse Water"

Pictured above are aluminum parts being rinsed after taking a bath in a solution of 20% sulphuric acid. The electrochemical formation of an oxide layer on the surface of the aluminum parts (anodizing) insures a stronger finish of the subsequent plating. The rinse bath must be kept in constant circulation. This is the important job performed by the Deming Fig. 4012 Centrifugal Pump illustrated below.



Deming Fig. 4012 (two ball bearing type) has separate liquid end construction. Only the liquid end parts need be made of corrosion-resistant alloys. This saves you money on first cost and future possible repairs.

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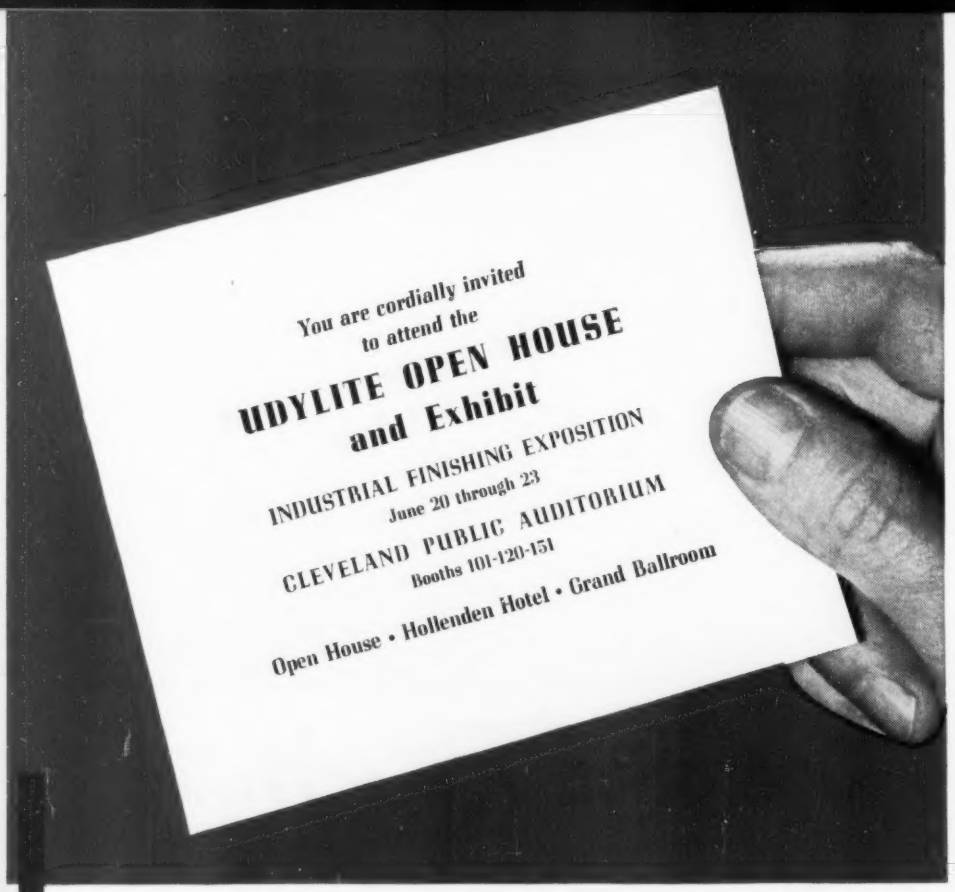

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Coffee at 10 p.m.

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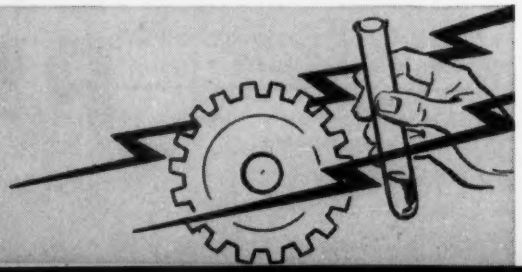


be lacquered, this can be done immediately after the pickling. A good pretreatment for lacquering is to first sand-blast and then subsequently pickle.

The Adhesion and Corrosion of Electroplated Aluminum

F. Solar: *Metalloberflaeche*. Vol. 5, No. 8, pp. B117-B120.

Apart from the oxide coating, an unfavorable factor for the adhesion of plated coatings on aluminum is the linear coefficient of thermal expansion. This is, for example, considerably higher than copper, nickel or chromium. A further disadvantage of aluminum lies in the strongly electronegative behavior, by which practically every metallic coating applied to aluminum is more electropositive than the base metal. With thin or porous plated coatings and in the presence of moisture, there occurs as a result an increased corrosive attack on the aluminum. The corrosion product requires more space and can lift and flake off the plated coating. Plated coatings on aluminum accordingly, if they are to fulfill their function in a satisfactory manner, must be pore-free and this is attained primarily by a sufficiently thick metal deposit. The critical and principal factor intervening in the plating of other metals on aluminum is the treatment of the aluminum surface before it is hung in the plating bath. The pretreatment processes which have been developed can be classified into three groups and these were variously tested by the author to ascertain their relative effectiveness and suitability for commercial plating on aluminum. These three groups are:

1. Processes which operate with an alkaline pickling treatment which, simultaneous with the solution of the natural oxide coating, deposits a thin metal coating, generally zinc, or brass or copper, and this coating is subsequently brass or copper plated in a cyanide bath. In practice, preference is given to those pre-pickling baths which work without current and at room temperature. The metal deposited by this process in a coating thickness of some tenths of a micron serves as the adhesion ground base which is strengthened in the plating bath.

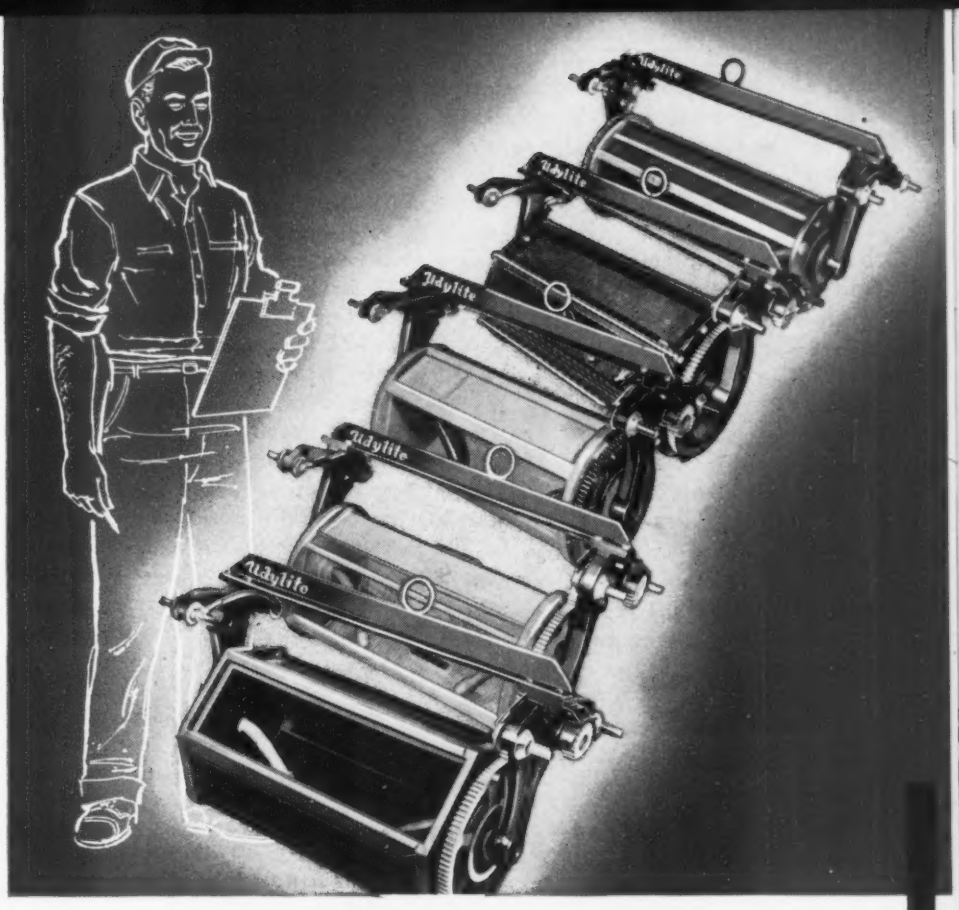
2. Processes which work with acid pre-pickling baths by which, here

also, with greater roughening of the aluminum surface, metals such as iron, nickel, and manganese are deposited in a thin coating which is subsequently strengthened in a weakly acid nickel plating bath. This prepickling also works generally without current but is applied at high temperatures (70 to 95°C.).

3. Processes which strengthen the natural oxide coating with or without the help of current and then again partially dissolve off this built-up oxide coating in acid or alkaline baths with subsequently or simultaneous deposition of copper or other metals. In this way an oxide network is obtained and this serves as a keying base for the deposited plated metal. This process requires a more expensive layout and a greater number of working stages and is used only in special cases.

These various processes were all tested as follows: Strips of 99.7% aluminum metal were degreased for a short time at 40°C. in 10% caustic soda, rinsed and then dipped in 1:1 nitric acid and, after rinsing, treated with one of the above three pretreatment processes. The strips were then plated, according to the pretreatment method used, in copper cyanide, nickel and acid copper baths as well as only in the acid copper bath. The total coating thickness amounted to 10 microns. The adhesion of the plated coatings on the aluminum was determined empirically by polishing down to the base metal on a cloth wheel with chalk paste. As good or bad adhesion is associated very considerably with the corrosion behavior, this was determined on unpolished specimens with a 500 hours immersion test in 3% sodium chloride solution at 20°±2°C. After every 100 hours, 5 strips were taken out, rinsed, dried and weighed.

The test results showed that, with the caustic soda bath under unfavorable operating conditions, the caustic soda is not completely washed off. If the aluminum part covered with a thin alkali film is then passed into the alkaline copper or brass bath, then the film is retained. Thus, with unsatisfactory rinsing, no firm bond is obtained between the aluminum and the plate. The conditions are still more unfavorable with cast aluminum, as it is hardly possible to remove alkali residue by rinsing from the pores. The results are poor adhesion



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and, after some time, corrosion spots and flaking even with the thicker plates. The copper potential also acts unfavorably to the aluminum as regards corrosion if the adhesion is not satisfactory. The acid pretreatment bath works at a lower concentration and the treated aluminum can be easily rinsed. The treated aluminum passes film-free to the weakly acid nickel bath and a firm bonding of the nickel to the aluminum is possible. The adhesion with the third pretreatment process was also found to be good. For aluminum plating it would appear preferable to conduct the pretreatment in a weakly acid bath and to deposit on this in plating baths with pH values between 5 and 6; the best results are obtained in practice according to this principle.

Black Finish on Bronze

Metalloberflaeche, vol. 5, No. 8, p. B 130.

A dip process is described by which an attractive black patina finish is obtained, the treatment given being the persulfate process. For bronze a 5% solution of caustic soda is used and for brass a 10% solution. The bath is heated to boiling and, simultaneously with the immersion of the parts to be blackened, there is added to the bath 10 g./l. of powdered potassium persulfate, as a result of which there is a strong generation of oxygen. The addition must be repeated when further parts are immersed for blackening.

Another blackening process, which is less suited for tin-rich bronze, employs what is termed the "Black Bath." This bath is a solution of 600 g. copper nitrate in 200 cc. water to which 2.5 g. silver nitrate can be added. The parts to be blackened are thinly dabbed with the solution, and then become covered with a green patina. With careful heating this becomes black. Sometimes the coating and heating must be repeated. A porous brown coating is brushed and the color is fixed with a wax brush.

Tin-Nickel Alloy Plating

Metalloberflaeche, 5 No. 8, pp. B130 to B131 and No. 5, p. B74.

It is stated by Dettner that conflicting reports have been obtained with the plated tin-nickel alloy. This alloy contains 65% tin and 35% nickel. In some quarters it has been put forward as the only possible substitute for nickel plate, other authorities have adversely criticized the color of the plate, the unsatisfactory chrome-plating characteristics of the alloy and the technical difficulties involved with the deposition. From other quarters it has been asserted that the alloy is easier to deposit than chromium.

A further note to clear up these conflicting views states that large scale, practical tests have been made with this alloy plate under plant conditions. Plating operations on a large scale, however, do not appear to have obtained results which justify the original expectations when this alloy was first introduced. The corrosion protective properties, according to investigations conducted in several places, is extremely low; the poor color and unsatisfactory chrome plating characteristics are again mentioned as well as the technical difficulties of plating. In England, where this alloy was first developed, a 30,000 liter bath was put into operation but reports say that the process has been abandoned.

Degreasing of Aluminum and Aluminum Alloys

E. R. Thews: *Beiztechnik*, **3**, No. 2, pp. 18-21.

Alkaline cleaning medii for aluminum and its alloys should contain no caustic alkali. The stronger carbonate solutions alone should also be excluded as far as possible for the same reasons. The 15% carbonate alkaline metal cleaning solutions, which are often used for degreasing purposes, noticeably, attack light metal surfaces at boiling temperature particularly if the surface is unusually dirty and the coarser surface impurities make necessary a longer processing treatment in the bath. The relatively neutral soap solutions also are not always the most suitable degreasing agent and these soaps differ widely in their compositions and chemical action.

For degreasing aluminum parts, in most cases mixtures of the alkalies are used which, in addition to the alkaline carbonates, as the base constituent, also contains additions of silicates, trisodium phosphate or similar corrosion-buffering agents. The favorable effect of these silicates can be ascribed to the formation of a film of insoluble aluminum silicate, apparently only of molecular thickness. A similar effect is obtained by the addition of small amounts of chromate to the carbonate solutions by which an insoluble chromate film is formed. The difference between the action of these two additions is that a chromate addition shows only a mild effect while a moderate addition of a silicate will practically completely inhibit the prominent corrosive action which is exerted by alkaline carbonates of even moderate concentration. The action of the silicates varies according to the composition; the more acid is the silicate composition, the greater is its protective action. A disadvantage of silicates in the degreasing bath is the fact that it is difficult to remove the silicate film in the rinsing bath. If it is intended to plate on the aluminum, this film can be a nuisance. For this reason, it is considered better to add tri- or tetrasodium phosphate to the bath. Trisodium phosphate is used in amounts of 10 to 50 g./l. (with 50-150 g./l. of carbonate). In the presence of greater amounts of trisodium phosphate than this in the bath, it is even possible to add a certain percentage of caustic alkali. A degreasing bath composition of this nature would be: sodium carbonate 50 g./l.; caustic soda 6 g./l.; trisodium phosphate 30 g./l.; sodium aluminate 8 g./l. Additions of water glass (sodium silicate) and/or sodium aluminate to the degreasing lye for aluminum alloy treatment has, in addition, the advantage that the blackening of the surface of the metal in the bath, which frequently occurs with copper-rich aluminum alloys, is in this way prevented. The following bath is recommended for the removal of very obstinate or adherent grease or oil residues from aluminum surfaces: sodium carbonate (calcined) 19 g./l.; caustic soda 22.5 g./l.; sodium silicate 11.5 g./l. Bath temperature is 85°C.

After a short time of treatment in the degreasing bath the surface of the aluminum part will darken and this is an indication that the metal is well degreased. After removal and rinsing, an acid dip should be given to the metal; a dip of a few seconds is given in concentrated nitric acid or in a mixture consisting of one part of concentrated sulfuric acid and 2 parts of conc. nitric acid. Slight surface roughening in addition to the degreasing action is often desired, particularly in cases where the aluminum surface is to be treated in the plating bath. A suitable cleaning bath composition to achieve this effect is: sodium carbonate 22.5 g./l.; sodium bicarbonate 45 g./l. The operating bath temperature is 90-95°C.

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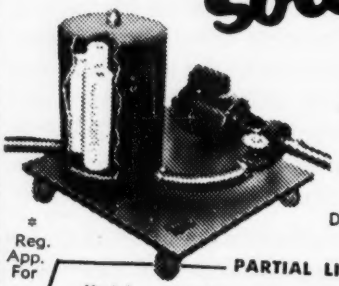

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New Pickling Bath Inhibitors

Beiztechnik, **3**, No. 2, p. 24.

Many varied organic compounds are used as pickling bath inhibitors particularly those which contain sulfur or nitrogen. It is known that thiocarbanilide possesses pickling inhibitive action. The product however has the disadavantage that it does not dissolve sufficiently well in dilute acids such as are used for the removal of rust and scale. Research has overcome this difficulty. It has been established that inhibitors which, in addition to thiocarbanilide, con'ain also solution-favoring aromatic sulfonic acids, acid-resistant reducing agents and sugar, have considerable advantages over inhibitors previously used. The combination allows of increased solubility characteristics of the thiocarbanilide and a consequent considerably increased inhibitive action. Suitable solvents are xylolsulfonic acid and the reducing agents are aldehydes. The sugar is an advantageous addition; it acts both as a reducing agent and as a buffering medium. Metal pickled in baths with these inhibitive additions is claimed to receive a bright and smooth surface.

Coating with Aluminum from the Vapor Phase

Aluminium (Germany), vol. 30, No. 8/9, p. 382 (1954).

The process comprising surface coating with aluminum by depositing this metal from the vapor phase is described. Steel parts are given a protective coating of aluminum by treating at high temperature in an atmosphere of dry hydrogen and aluminum chloride vapor. The steel is preferably heated to a temperature of 900-1,000° C. The aluminum chloride vapor is decomposed into aluminum metal which alloys with the base metal, and into chlorine which is converted into iron chloride. The protective value provided is still higher if aluminum is used with some copper in the ratio of 1 to 5 parts to 100 aluminum. To achieve this, aluminum chloride vapor containing copper chloride is used.

The treatment requires a period varying from 10 to 60 minutes. To reduce the brittleness of the coating, it is recommended that the treated steel parts be submitted to a subsequent thermal heat treatment at about 1,000° C. in hydrogen or air.

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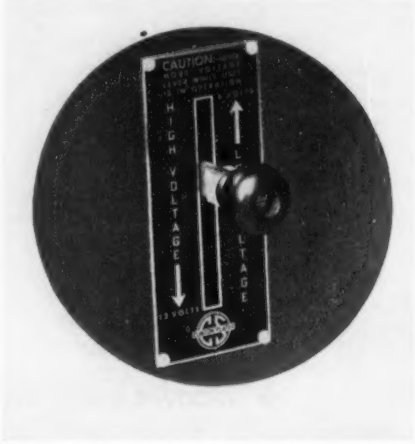
Clinton Supply Co., Dept. MF, 110-112 S. Clinton St., Chicago 6, Ill.

The above firm offers its heavy duty selenium power rectifier twins, complete with built-in voltage regulators and all necessary operating accessories. They are said to be engineered for safe, cool operation and protected against overload and corrosion.

The rectifiers feature the "dual-o-matic" transformer circuit, manually operated from the Hi-Lo voltage selector switch. This permits maximum nameplate D.C. amperes rating to be drawn on either the 6 or 12 volt operating range, according to the manufacturer. The operating lever protrudes through side of cabinets and voltage settings are obtained instantly simply by moving switch lever up or down to required voltage setting.



Model 1512HO2 (1500 amp.) is available at $1,295 and Model 201-2HO2 (2000 amp.) at $1,595, both F.O.B. Chicago.

Filter for Corrosive Solutions

Sethco Mfg. Co., Dept. MF, 70-78 Willoughby St., Brooklyn 1, N. Y.

For highly acid solutions which corrode stainless steel, the new Sethco filter pumps VHI-5 and VHI-10, rated at 50 and 100 gal./hr. respectively, are equipped with Hastelloy C pumps, fittings, rigid unplasticized polyvinyl-chloride filter assemblies.

The rigid P.V.C. filter assembly offers complete resistance to any type of plating or electropolishing solution. Consequently, the VHI series are the most all around corrosion resistant filter pumps on the market, according to the manufacturer.

Motors are totally enclosed, ball bearing, 110 Volt, 60 Cycle, Single

Phase type. Pump, filter assembly, and motor are mounted on a corrosion resistant, linen impregnated, phenolic panel with ball bearing, rubber tire casters for easy portability. Each unit comes equipped with 10 foot lengths of chemical inlet and outlet hose. A plastic strainer is furnished with the inlet hose.

Coating Thickness Tester

The Lea Manufacturing Co., Dept. MF, Waterbury, Conn.

The above manufacturer has placed on the market an improved design of the Lectromag, a precision instrument for measuring thickness of non-magnetic coatings such as zinc, copper, cadmium, lacquer, etc., on carbon steel or iron.

Improvements in design and utility of the instrument include:

a—Calibration with National Bureau of Standards thickness samples.

b—Plug attachment at side rather than top, providing better, 360°F. visibility of the indicator, sturdier construction and easier manipulation of the tube assembly.

c—Knurled rather than smooth top on the glass tube assembly, providing a better grip for manipulating the glass tube.

d—New compact instrument case with calibration chart for easy and simple calculation of thickness.

The instrument is shipped in new

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When it comes to **ELECTROPLATING** and allied operations, one name means most to the men who buy . . . **H-VW-M** . . . the manufacturer who supplies every major requirement in processes, equipment and supplies.

Single source? . . . Yes, and what's more important—single responsibility.

PLATEMANSHIP is H-VW-M's unique combination of: the most modern and complete laboratory for testing and development . . . the ability to provide complete equipment and supplies for every plating and polishing need . . . the complete background of knowledge and experience in every aspect of plating, polishing, cleaning and anodizing.

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TRUPLATE GOLD
Gold and alloys custom made to meet your specifications

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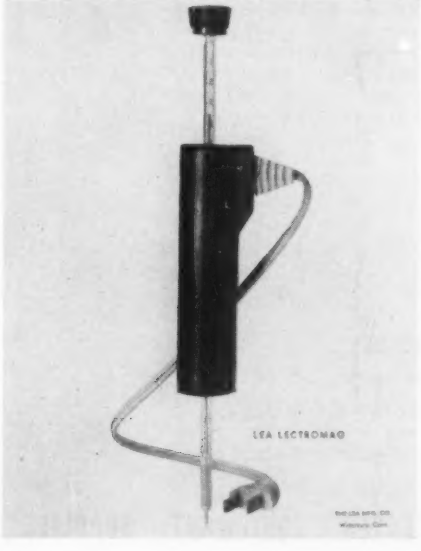


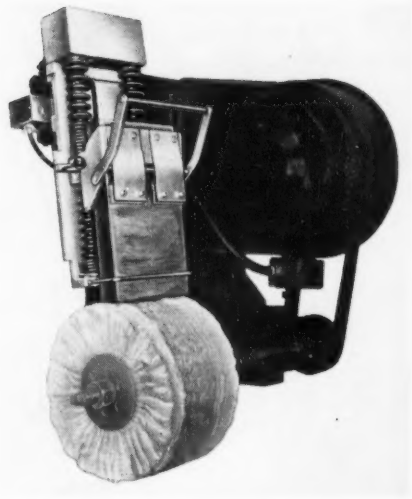
type of container designed to prevent breakage or other damage in transit, and has a thickness testing range from 0.0002" to 0.008" with the following accuracies: ±15% on thicknesses under 0.001" and ±10% on thicknesses over 0.001". The unit operates on 110-115 v.. A.C. 60 cycle current, with a voltage variation compensating feature.

Complete details may be obtained by writing or calling the above manufacturer.

Composition Applicator

Packer Machine Co., Dept. MF, Center St., Meriden, Conn.

An all new, improved, completely enclosed composition applicator for all types of bar compounds and rouge,



applied automatically to buffing wheels, is the Model No. 60 (shown), which is readily adaptable to automatic, semi-automatic equipment, as well as hand jacks. It is designed to hold any length compound bar and will feed 10 inches of compound in one setting. Power is provided by a 1/20 H.P. motorized reducer drive — 115 volts. 220 volts optional.

Buffing Compound for Stainless Cutlery

Russell H. Burns Compound Co., Dept. MF, 810 Lincoln Blvd., Middlesex, N. J.

A new buffing compound, specially formulated to produce deep color on stainless steel cutlery, is made from pure calcined aluminous oxide with a binder of pure animal fatty acids. According to the above manufacturer, Steel Hue compound is completely free from iron contamination.

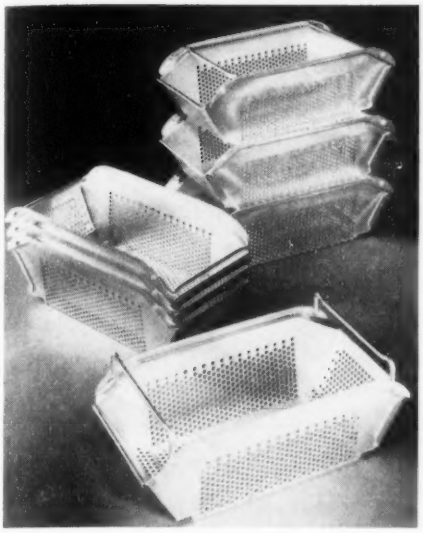
Cakes are molded in the cartons in which they are shipped for protection against breakage and chipping. The compound is also available in special sizes to accommodate automatic buffing machines.

Stainless Steel Baskets

Chas. Wm. Doepke Mfg. Co., Inc., Dept. MF, 8886 Blue Ash Road, Rossmoyne, O.

The above firm's new line of perforated stainless steel baskets combine the strength and rigidity of the standard sheet steel Nestier box with the rapid draining and easy cleaning features of the basket.

Of all-welded, die-made construction, the new basket is available in five different sizes ranging from 12 inches to 36 inches in length, the units



can be supplied in various types of stainless steel as well as in aluminum or cold rolled steel. A variety of perforation sizes is offered.

Design of the perforated basket permits handling parts or products throughout all production operations in the same container, thus eliminating rehandling of contents into special baskets for dipping or degreasing.

When filled, the baskets tier in rigid stacks, with contents of each unit fully visible and accessible through double hopper ends. Empty baskets nest, saving valuable floor space.

Hot Zeolite Water Conditioner

Cochrane Corporation, Dept. MF, Philadelphia 32, Pa.

Exceptionally pure water for boiler feed and process use is achieved at unusually low cost through use of the company's hot process hot zeolite water conditioner, which combines a hot process softener with a hot zeolite softener. The two-stage system is the result of comparatively recent developments in ion exchange resins which permit the operation of zeolite softeners at temperatures up to 250°F.

The manufacturer states that the hot process-hot zeolite combination requires a lower capital investment than a comparable two-stage hot lime soda hot phosphate softener. Chemical costs are also lower since the zeolite softener uses salt for regeneration instead of more expensive soda ash and substantially reduces supplementary phosphates. The softening operation is simplified and reliable and compensates for variation of hardness in the influent water.

This combination of the two most popular methods of water softening more effectively lowers the silica content of the treated water. It also reduces alkalinity of the effluent to approximately half the value attained by hot process softeners, with a consequent reduction of carbon dioxide in the steam.

PRE-CLEAN to Improve Your Plating

When plating steel, buffed die-cast or other metals, an initial pre-cleaning with a Magnus solvent cleaner makes your electrocleaning solution work faster and more effectively over a longer period of time. At the same time, quality of plating, with less rejects, is greatly improved.

PRE-CLEAN to remove smut, buffing, polishing and drawing compounds and similar dirts.

PRE-CLEAN to remove solid dirt particles, embedded or stubbornly bonded, which do not come off with degreasing.

PRE-CLEAN without fumes, by using Magnus Pre-Cleaners.

PRE-CLEAN without corrosion or attack on metal. There's a Magnus Pre-Cleaner to do a safe job . . . and a fast job . . . without attack.

ASK FOR COMPLETE INFORMATION OR A PRE-CLEANING DEMONSTRATION IN YOUR PLANT.

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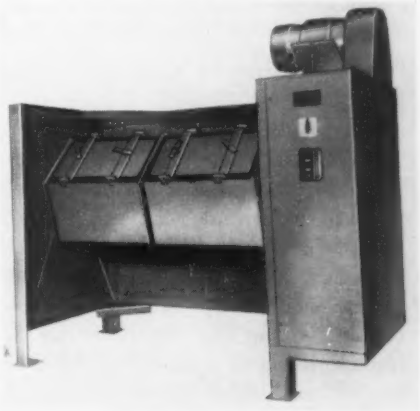
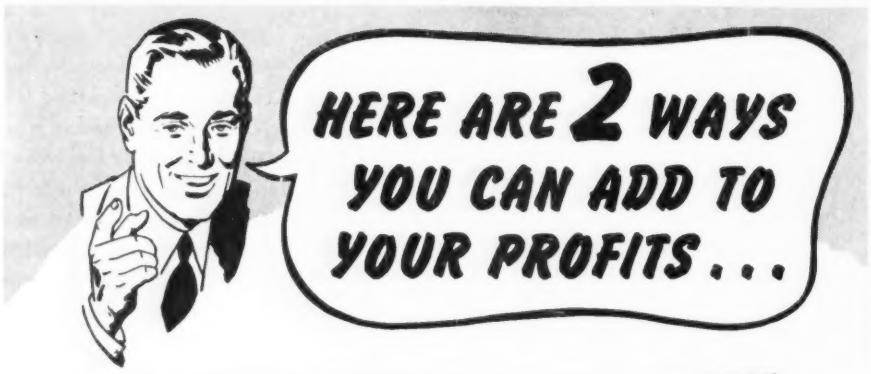
Tumbling Barrel

Rampe Manufacturing Co., Dept. MF, 14915 Woodworth Ave., Cleveland 10, O.

A new and larger size precision barrel finishing machine known as the V-8 model, features truly versatile 8 cu. ft. capacity. A much improved direct drive does not require chains or sprockets. The standard equipment includes a magnetic brake motor with jogging and reverse switch, a waterproof start-stop switch mounted on the front panel for easy access, and a large cover completely housing the variable speed drive.

Shipments of the machine now are available from stock in 1 to 4 barrel





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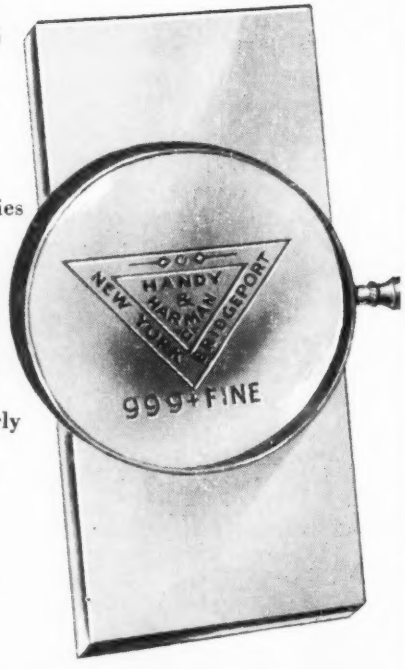
Use Handy & Harman 999 "Plus" Fine Silver Anodes — the anodes that assure top-quality, trouble-free silver plating because... they are held to highest standards of fineness... they are free of every trace of impurities that can cause plating troubles... they are always uniform. Try them and see the difference.



2. ON REFININGS

Send your silver plating solutions and other precious metal scrap, sweeps and waste to Handy & Harman regularly for refining. Tried-and-proved scientific processes, skilled personnel, super-accurate equipment, long experience — all combine to assure recovery of every bit of value from every lot and an *accurate return every time.* Try us with your next shipment and let the return speak for itself.

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compartments, either unlined or lined with the manufacturer's very successful vinyl plastic lining—the only no-seam lining on the market, it is claimed.

Line-Operated pH Meter

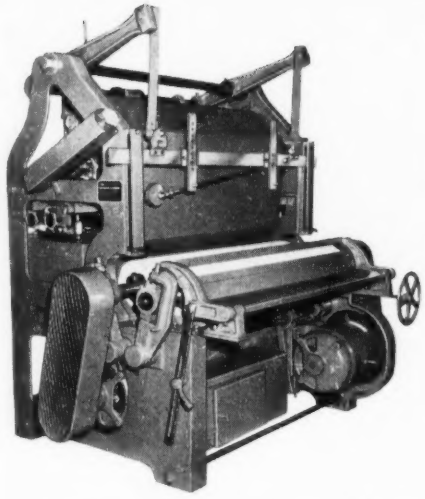
Photovolt Corporation, Dept. MF, 95 Madison Ave., New York 16, N. Y.

Incorporating a large-size indicating meter of 7″ scale length, which covers the entire pH range from 0 to 14 without switching and without reversal of the pointer travel, the new instrument can also be furnished in a portable shape with baseboard and carrying cover. The available accessories include a swing-arm adapter for immersing the electrodes by tilting motion and a shielding hood for use of unshielded electrodes.

Double Roll Polisher

Nicholas Equipment Co., Dept. MF, Bellevue, O.

The above company's mirror finishing machine is suitable for all types of glazing, polishing and buffing on flat work from pocket knife blades up to pieces 14″ in length. Speed of work carriage is infinitely variable both upward and downward and stroke selector permits pre-determined number of passes, preventing over-polishing. Work automatically rises to safety position at end of cycle. The working stroke adustable with simple hand set strikes. Face loading is at convenient operator position and safety is assured by automatic shutdown during loading.



A motor driven oscillator with selective stroke drives a pitman arm through special joints. Quick change pulleys permit change of speed as buffs wear down. The large diameter rolls, 48″ wide, running at high speed on 2½″ heavy-duty arbors, are capable of producing better finishes on more work in less time than conventional machines, it is claimed. Manual wheel positioning permits wide spacing for double hung work. Automatic wheel release opens rolls to prevent wearing off the tip or choil.

The machine is 65″ long, 53″ wide and 74″ high, weighing 3,500 lbs.

Rotary Pumps

Pump & Equipment Corp., Dept. MF, 201 Sweetland Ave., Hillside, N. J.

A new line of rotary type pumps, combining the basic self priming, no stuffing box, no shaft seal features of the Vanton Flex-i-liner pump with a design that permanently protects all bearings from fumes or chemical attack has just been announced. Designated as the XB series (to signify that bearings are external) the new pumps are available in capacities from fractional to 5 g.p.m., with 0-50 psi discharge pressures.

Both shaft bearings are housed in a cast iron pedestal which is external to the pump itself, and the center bearing is completely enclosed within the stainless steel rotor and sealed off by a stainless steel plug on one side and a carbon bearing-guard on the other. End plates, formerly of aluminum alloy, are now being shellcast in stainless steel.

Another interesting design feature is the cantilever type mounting which simplifies disassembly of the pump and makes it possible to replace liners when necessary without disturbing port con-

nections or detaching the pump from the base plate. In addition, reassembly is further simplified with insured true bearing alignment for smooth and quiet operation. A grease fitting is provided in the cover plate for periodic lubrication.

The XB design similar to the standard Flex-i-liner pump, assures that the fluid being pumped will contact only the outer surface of the liner and inner surface of the body block. Since these parts are available in a wide variety of plastics, natural or synthetic rubbers, or stainless steel, the XB is ideal for an endless list of corrosive chemicals or abrasive slurries.

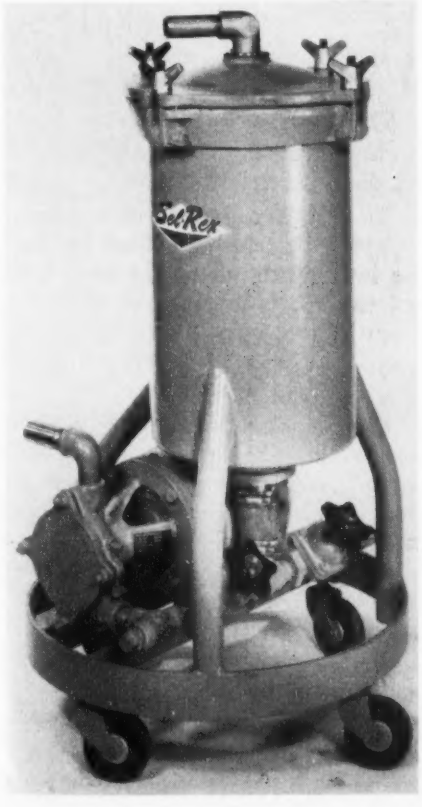
Solution Filter

Bart-Messing Corp., Dept. MF, 229 Main St., Belleville 9, N. J.

Continuous high capacity with either a completely new stainless steel-cloth bag element or porous stone is provided by the 800 GPH capacity Sel-Rex "Little Giant" filter.

This compact unit is easy to service too, and can be completely cleaned in less than 15 minutes. The entire filter element is fastened to the hand tightened cover, and can be lifted out manually for quick and thorough washing.

The portable filter requires only 50" of head room and measures 32" in diameter at the base. All working parts are suspended underneath the tank to protect them from dirt and drippings. Units are constructed of extra low carbon stainless steel, and are furnished complete with operating valves, motor and pump. Units are also available with all iron parts for use with alkaline solutions.



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Eighteen years of full time, intensive research dedicated to *results* is your assurance that these Promat-quality products can be depended upon to perform as specified . render results that *match* your requirements.

Addition Agents for acid cleaners: PROMAT 7073 and 7076.
RESULT: Clean, oxide-free surfaces for electrodeposited metals.

Addition Agents for cyanide and acid zinc plating solutions: C-42, B-4, B-4M, 6550 & 6555.
RESULT: A uniform deposit of fine grained zinc with exceptional luster and protective value.

Addition Agents for cyanide copper plating solutions: PROSALT.
RESULT: A fine grained deposit—excellent for selective hardening and as a base for decorative finishes.

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RESULT: A deposit with high luster and long time protection against corrosion.

Chromate Conversion Coating — The PROSEALS.
RESULT: The ultimate in protection for electrodeposited zinc and cadmium and alloys of aluminum, zinc and copper Available in olive drab, bronze and bright phases.

White and Yellow Brass — PROBRITE and PROSALT.
RESULT: A full bright highly protective decorative finish which is unaffected by metal allocations.

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PROMAT MEANS *results* in PROTECTIVE MATERIALS

PROMAT Division
Poor & Company
851 S. Market Street
Waukegan, Illinois

Protective Coatings

Carboline Co., Dept. MF, 331 Thornton Ave., St. Louis 19, Mo.

Announcement has been made by the company of three new modifications of their popular Phenoline 300.

The coatings are modified phenolics, thermosetting at room temperature, for use as tank linings, severe maintenance painting and floor coverings in acid, alkali and solvent environments. Modifications 302, 305 and 315 with a new 301 prime coat and 303 intermediate coat were developed to give more specialized recommendations for solving specific problems. Thicknesses of 10 mils per brush or spray coat and as high as ¼ inch by troweling are obtained. They can be applied in the field without special equipment. Repairs to damaged surfaces are easily made.

The company's long experience with Phenoline 300 has enabled them to formulate these modifications each with specific improvements for such requirements as strong nitric acid resistance, better thermal shock resistance, greater flexibility and resiliency, erosion resistance, etc. The company feels that as a result of these new ma-

CIRCO DEGREASERS

NEW DESIGN

MODEL OP2

- **Will last twice as long!**
- **Reduce solvent costs 30% or more!**
- **Cut labor costs!**
- **Up to 40% less maintenance!**

NOTE THESE FEATURES . . .

1. **Unobstructed tank walls.** Condensing coil and condensate pan are recessed providing superior vapor control, effective solvent reclamation and unobstructed working area.
2. **Demand type water control.** Insures using water only when needed, thereby reducing operating cost. Placement of nickel plated condensate coils in conjunction with new type water control eliminates water condensation along the sidewalls of degreaser, thus, preventing rusting of the sidewalls and acid solvent, increasing the life of the degreaser.
3. **New pump design.** All pump parts are fabricated of stainless steel. The rotor and end plates are nickel clad. Rotating magnetic field drives impellor, thus, the pump is completely sealed except the intake and outlet, preventing leakage.
4. **Lower height.** Working height reduced for easy operation.
5. **Built-in storage tank.** Holds adequate reserve for flushing in addition to entire contents of degreaser sump.
6. **Less floor space.** Designed to operate from either side.

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OVER 208 STANDARD MODELS... including Circosonic ultrasonic degreasers. All backed by nation-wide technical field service.

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Vapor and Ultrasonic Degreasers • Metal Parts Washers • Dryers • Solvent Recovery Stills

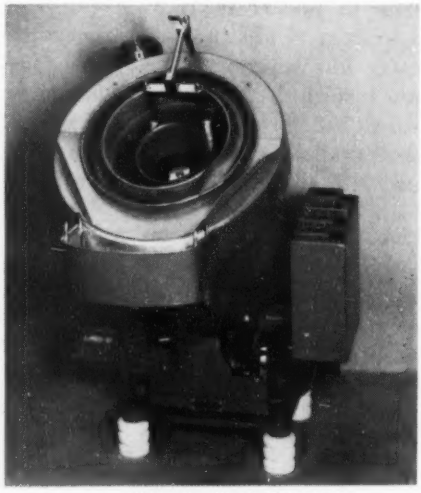
terials they are now able to better recommend the appropriate material for the specific condition and increase the coating life to the customer.

Detailed information on the series is contained in an attractive two color, four-page bulletin Number 600 just released by the company.

Chromium Plating Barrels

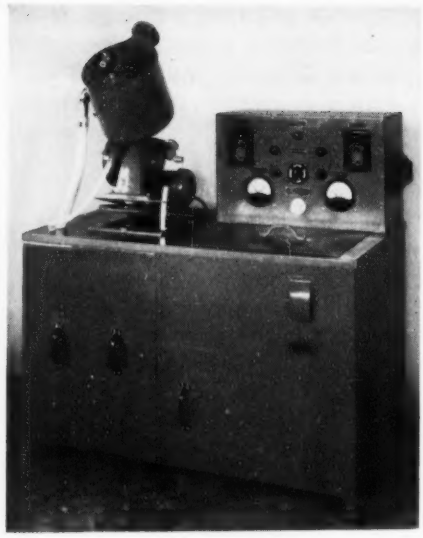
The Dawson Corp., Dept. MF, 302 5th Ave., No. Pelham, N. Y.

A barrel-type chromium plating machine, which does away with racks or fixtures in the plating of small parts, is claimed to be the first successful barrel plater marketed in America. The Riedel barrel makes it possible to plate small parts by simply dumping them into the basket and processing them for about ten minutes. A uniform bright or dull chromium plate may be obtained.



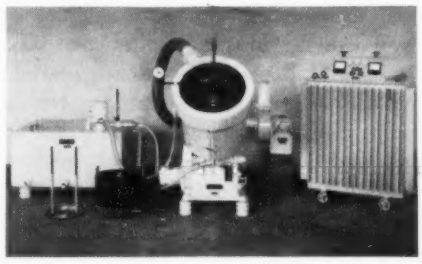
"Standard" Model

Capacity: 10½ gallons; Barrel dimensions: 20 in. diam. x 20 in. deep; Charge: up to 10 lbs.; Max. current consumption: 750 amperes.



"Economy" Model

Capacity: 1¼ gallons; Barrel dimensions: 10 in. diam. x 10 in. deep; Charge: Approximately 1 lb.; Max. current consumption: 250 amperes.



"Automatic" Model

Capacity: 13 gallons; Barrel dimensions: 23½ in. diam. x 23½ in. deep; Average charge: 10 lbs.; Max. current consumption: 750 amperes.

These barrel platers are available in three general types:

1) The "Economy," with a capacity of approximately 1¼ gallons for short or intermittent plating of very small pieces, such as watch parts, etc.

2) The "Standard" with an approximate capacity of 10½ gallons of plating solution.

The Standard is extremely versatile as to the size and shape of parts plated, and is especially designed for long production runs. It is equipped with a vapor exhaust and either a water jacket for cooling or a reserve tank through which the solution is circulated.

Both models are supplied with two baskets so that one may be loaded while the other is working, thus assuring virtually uninterrupted operation.

3) The "Automatic" model, de-

-igned for mass production plating of small parts, is continuous in operation. Parts are fed into a funnel and brought out after plating by a worm conveyor without interrupting the flow of work.

With a capacity of approximately 13 gallons and a plating cycle averaging 8 to 10 minutes this machine can produce up to 85 lbs. of plated parts an hour, with completely automatic push button operation.

Teflon Packing

Flexrock Co., Packing Division, Dept. MF, 3608-U-Filbert St., Philadelphia 1, Pa.

A new packing, Flexrock 403, makes an outstanding emergency packing and is the most succesful Teflon packing for centrifugal applications, according to the above manufacturer.

The packing is composed of shredded Teflon combined with suitable binders and lubricants extruded into an open cotton yarn jacket impregnated with graphite. This packing is also

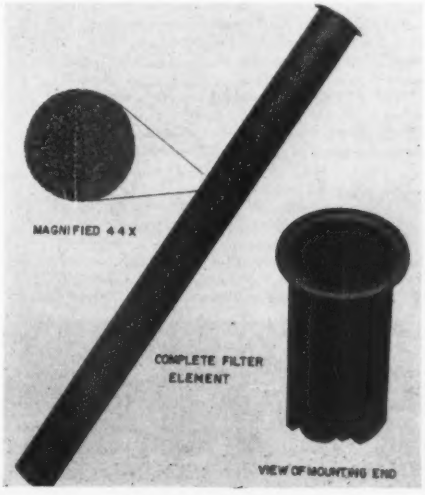
available impregnated with mica for use wherever a non-contaminating packing is essential. All the outstanding qualities of pure Teflon are incorporated in the packing. It is chemically inert and will not be attacked by any organic or inorganic acids, alkalies, or solvents.

Porous Stainless Steel Water Filters

Micro Metallic Corp., Dept. MF, 30 Sea Cliff Ave., Glen Cove, N. Y.

A new porous stainless steel filter is specifically designed for filtration of water with diatomaceous earth filter aid.

The new water filter, called type "CX," is designed for use with filter-aid. Fabricated from a newly developed type of porous stainless steel, it is specifically designed to pre-coat



without recycling, and to backwash completely clean.

The one piece, all welded, self-supporting porous stainless steel filters combine filtration efficiency with permanent, shock resistant virtually damage-proof elements reducing maintenance costs to an absolute minimum. Similar materials have five year records of continuous service in water filtration. Complete standard filter installations and custom designs are immediately available.

Heat Exchangers

Falls Industries, Inc., Dept. MF, 31781 Aurora Road, Solon, O.

This new line of unitized pumping heat exchangers gives a versatile, packaged piece of equipment com-

Each of U. S. Stoneware's many products for platers has been developed with two thoughts kept constantly in mind: (1) to lower plating costs, (2) to improve plating quality.

Designed and developed by engineers and chemists expert in the selection and use of corrosion-resistant materials, "U. S." products for platers have been field-tested, field approved.

Feel free to consult U. S. Stoneware plating specialists without obligation. Their rich background of experience may be of help in solving many of your plating and finishing problems.

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Automatic Buffing of Screws, Shells, Caps.

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Rejects refinished and work returned complete.
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SPECIFICATION PLATING

Plating thickness and Corrosion Resistance assured by
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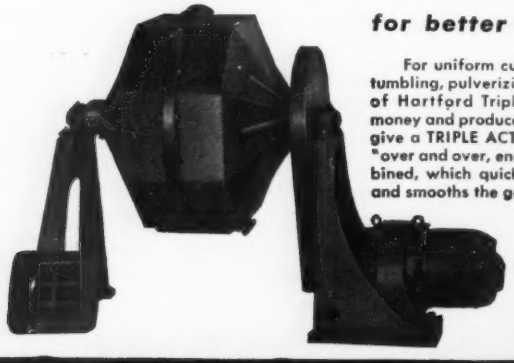
Complete Laboratory Control.

The **CHROMIUM PROCESS** *Company*
SHELTON, CONNECTICUT

Assistance gladly rendered on Dimensional Allowances or other Plating Problems. No Obligation. Samples plated without charge.

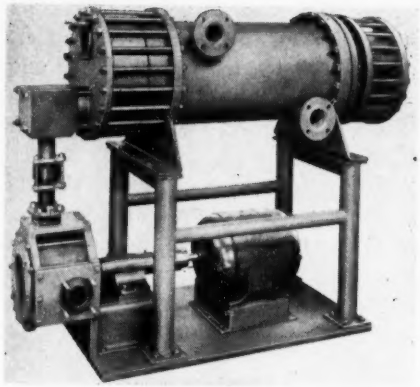
HARTFORD *TRIPLE ACTION*
CUTTING *and* TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request. 2HS52R

DETROIT 2 — W. S. TURNER, 445 NEW CENTER BLDG.
THE HARTFORD STEEL BALL CO. Hartford 6, Connecticut
LOS ANGELES 15 — E. D. MALTBY CO., 1718 SOUTH FLOWER ST.
WICHITA 1, KAN. — A. E. WERNER, ORPHEUM BLDG.
CHICAGO 6 — VICTOR R. CLARK, 605 W. WASHINGTON BLVD.
NEW YORK DISTRICT — NEWARK 2, 1060 BROAD ST.
KANSAS CITY 8, MO. — T. R. WHITE, 1919 BALTIMORE AVE.
EXPORT OFFICE — R. A. RODRIGUEZ, INC., 55 W. 42 ND ST., NEW YORK 18



pletely factory fabricated, tested and ready for immediate operation. It is designated the "Pumping-X-Changer."

If desired, the new exchanger can be made portable. This feature can be especially advantageous for pilot plants, plating and pickling operations, or any instance where small batch operations are performed.

The exchanger is produced from Impervite, an improved form of impervious graphite, which is immune to the effects of all corrosives except a few very highly oxidizing agents. It is relatively light in weight, is completely unaffected by thermal shock, and possesses an unusually high rate of thermal conductivity.

The assemblies are produced from standard, stocked tube and shell heat exchangers (to 917 sq. ft. transfer surface) in combination with standard centrifugal pumps (to 200 g.p.m. at 100 ft. head). Larger heat exchangers are available on special order.

Neoprene Based Coating

Rubber & Plastics Compound Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y.

The above manufacturer has added Nerva-Kote TNE, a neoprene based coating, to its line of heavy duty corrosion protective and waterproofing materials.

The coating provides a genuine tough rubber film, practically a lining, to prevent the attack by corrosive fumes, salt spray, alkalies, oils and aliphatic solvents. It has a very tenacious grip to metal and concrete, it is extremely waterproof, and resists abrasion and weathering in the highest degree, according to the company.

Use of the material is indicated for protection of structural steel, ducts, tanks, process equipment, gutters, railings, pipes, etc., exposed to the above-mentioned corrosive action and the weather elements. It is comparatively

cheap, because it requires only two or at most three coats, without any expensive priming or preparation."

Pipe Thread Sealing Compound

The Gilbreth Company, Dept. MF, 1211 Chestnut St., Philadelphia 7, Pa.

Gilbreth 18 is a new thread sealing compound of "Teflon," which is recommended for pipes carrying volatile acids, alkalies and solvents.

The material is chemically inert, and can be used continuously from 150°F. to 500°F. It seals threads completely without cementing and equipment can be readily dismantled after intensive use.

Anti-Rust Paint

Chem Industrial Co., Dept. MF, 3784 Ridge Rd., Brooklyn 9, Ohio.

A new black anti-rust paint, CI-88, that is said to afford low cost protection of exterior metal work, incorporates a bituminous base with a special paint vehicle to produce a heavily bodied coating which can be applied on outside metal after a minimum of surface preparation.

The manufacturer advises that the paint dries to a semi-gloss finish and is intended for use as a finish coating and not as a primer. One application is said to be sufficient for most surfaces. It can be applied by brush, spray or dip and is available in 5-gallon pails, 55-gallon drums and tank car lots.

HERE'S A TIP ON
CHROMIUM PLATING

INSTALL POWERS
Automatic Temperature Control
For All Metal Finishing Processes

For plating tanks and other metal finishing processes. Powers Controls quickly pay back their cost by accurately holding solutions at a constant uniform temperature.

POWERS CONTROL

3

POWERS

TECHNICAL DATA SHEET
CHROMIUM

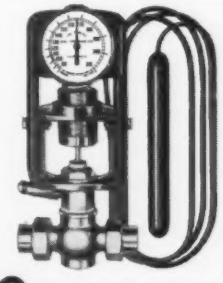
IF you plate—CHROMIUM

***Too high a temperature* can result in:**

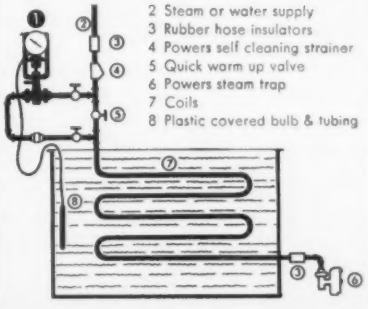
1. Burnt deposits
2. Frosty deposits
3. A decrease in cathode efficiency
4. A loss in throwing power
5. A soft deposit

***Too low a temperature* can result in:**

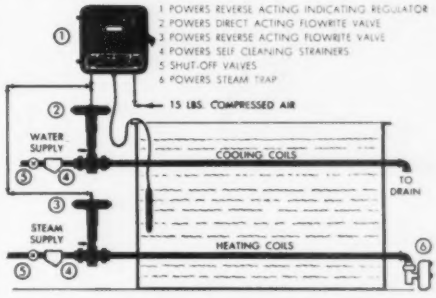
1. A slow rate of plating
2. Milky deposits
3. A decrease in tensile strength
4. A decrease in deposit density
5. Cracked deposits
6. Dark deposits



1 POWERS No. 11MF Self-Operating TEMPERATURE INDICATING REGULATOR


2 Steam or water supply
3 Rubber hose insulators
4 Powers self cleaning strainer
5 Quick warm up valve
6 Powers steam trap
7 Coils
8 Plastic covered bulb & tubing

COMPRESSED AIR OPERATED CONTROLS FOR PRECISE CONTROL OF HEATING and COOLING



In plating tanks, washers, heat exchangers, degreasers, Powers Temperature Controls more than pay for themselves. They save by stopping costly *over* or *under* heating.

Regardless of the size of your plating operation, there's a Powers Temperature Control precisely suited to your needs.

(c27)

THE POWERS REGULATOR COMPANY
SKOKIE, ILLINOIS • OFFICES IN CHIEF CITIES IN U.S.A. AND CANADA • SEE YOUR PHONE BOOK

THE POWERS REGULATOR COMPANY, 3400 Oakton Street, Skokie, Illinois

☐ Please send Bulletin 330 and Prices on Powers No. 11-MF Temperature Regulator for _____ (Print name of process or type of plating)

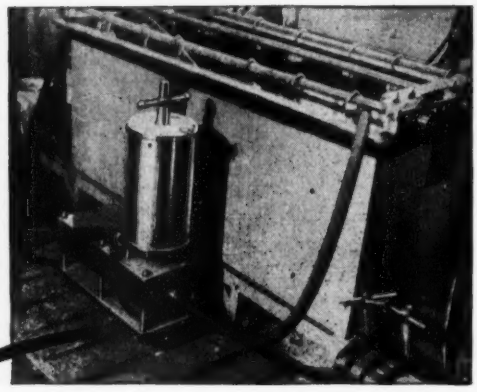
☐ Send Bulletin and Prices on Temperature Control for: ☐ Heat Exchangers ☐ Washers ☐ Degreasers

Name _____ Title _____

Company _____

Address _____

CHECK the advantages



of using a "Sealed-Disc" Filter

YOU'LL . . . . . be impressed too . . . . . with these proved performance features.

Models for any size or type installation in Stainless Steel, Monel Metal, Plain Iron, etc.

Small, compact — requires exceptionally small floor space coupled with remarkable filtering speed and volume.

Completely enclosed and air tight — eliminates loss of liquid from dripping.

"Sealed-Disc" Filters are complete as shown — slurry mixing tanks are not needed — filtering powders are not generally required.

Simplicity of design assures savings in operating time and labor with positive trouble-free performance.

Every plater who uses a "Sealed-Disc" Filter is impressed with it's positive, trouble-free performance.

Regardless of the size or type of your plating installation, there's a "Sealed-Disc" Filter "to fit your job" — you can depend on these proved performance features — you can be sure that all dirt, sludge, and even the invisible impurities are removed from your plating solutions.

"Sealed-Disc" Filters were designed especially to meet plating room requirements. They are smaller, more compact and portable than ordinary Filters, yet they are capable of handling equal volumes of solutions. Ask your regular plating supplier to tell you about the "Sealed-Disc" Filter that has helped so many platers get better finished plated work with savings in time and labor — or write for details.

ALSOP ENGINEERING CORPORATION

1006 Bright Street Milldale, Conn.

Other Alsop plating room equipment

We manufacture a full line of Mixers and Agitators covering a complete range of sizes, for mixing, blending and dissolving. Stainless Steel Mixing Tanks are also available in a wide range of capacities. For full details and illustrations write for your free catalogue.

Mechanical Finishing Machine

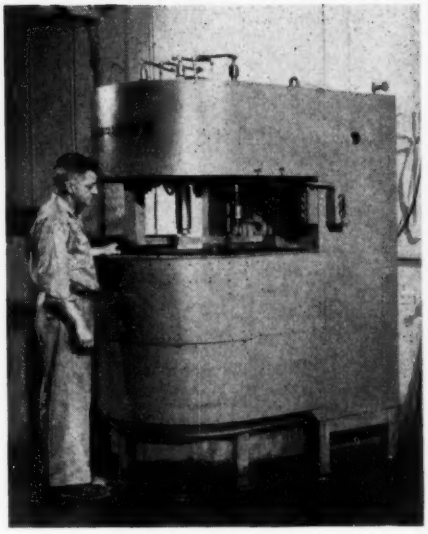
Roto-Finish Co., Dept. MF, Kalamazoo, Mich.

A unique and semi-automatic mechanical finishing machine for finishing a wide variety of parts in a relatively short time cycle, called the "Roto-Mite," is designed primarily for small lot production or experimental work.

The machine is designed with a removable tub in which finishing mass is contained and rotated. This feature allows use of several tubs with different type masses. Tubs can be changed quickly to allow change-over from one operation to another. Each tub is a complete unit with built-in sludge removal system. Removal of the tub does not require any modification or adjustment of the driving mechanism as the drive is a separate unit on which the tub is mounted. Another important feature of the new machine is a variable speed drive which further increases its versatility.

Weighing some 3,500 pounds, the new machine requires floor space, exclusive of operator's working area, measuring only 4 feet 6 inches wide by 7 feet 4 inches long by 7 feet 6 inches high. The tub is 44 inches in diameter with a working depth of 13 inches.

Other features of the tub include: locating and locking devices; an arrangement for continuous sludge removal through the bottom; a collector



ring which has pipe fittings to allow connection to a recirculating tank or drain. A special floor is not required, according to the manufacturer.

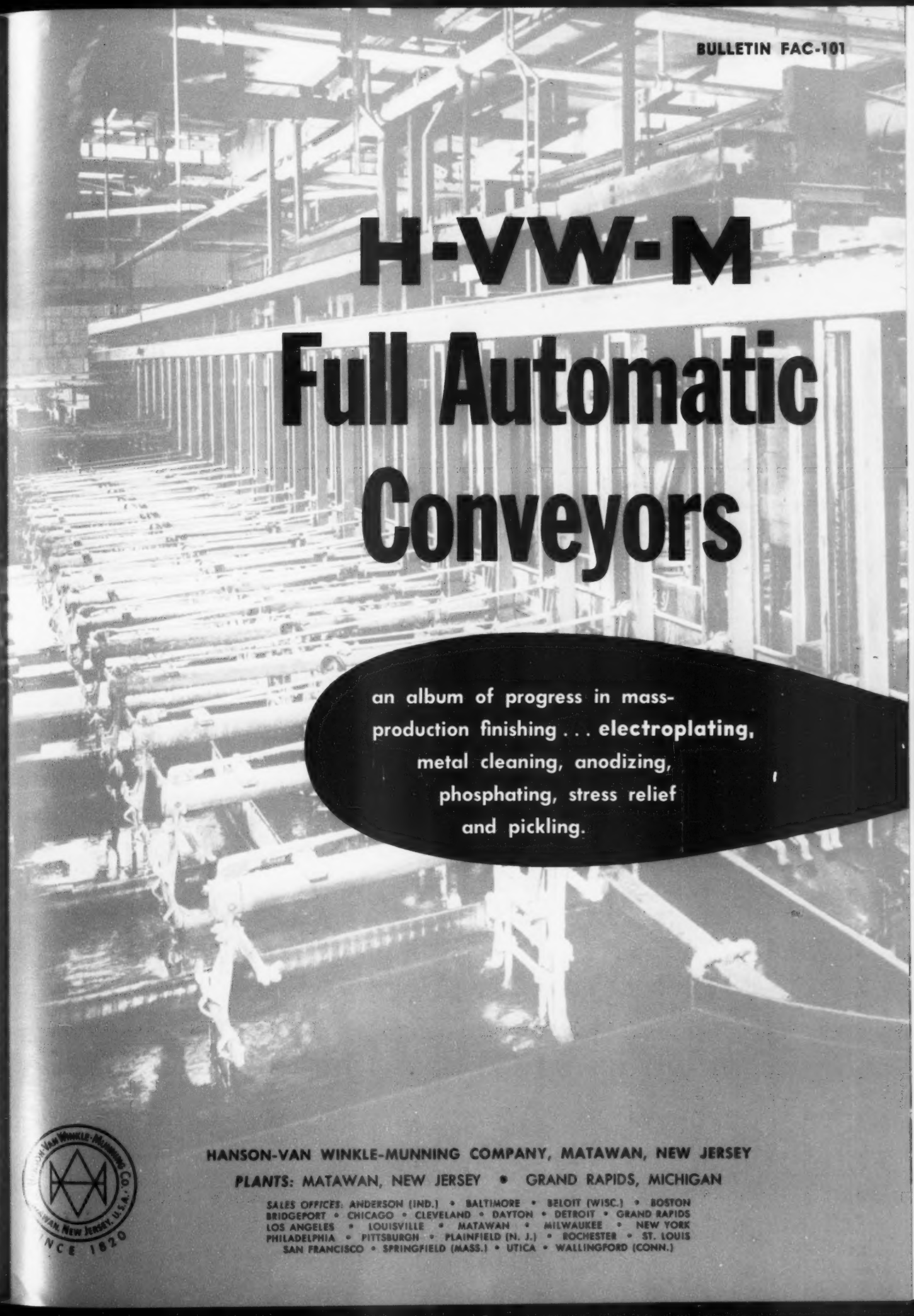
Main drive is a 5 H.P. U. S. Varidrive vertically mounted in rear of the machine. Power unit is belt-connected to tub drive assembly. A remote speed control allows selection of processing speeds from 100 to 500 feet per minute.

In operation, the parts are held in fixtures attached to lower ends of vertically mounted spindles, which are mounted above the mass. Spindles lower to submerge parts in the rotating processing mass. As the spindle submerges the part into the mass, it rotates, thus all sides of the part are exposed to the mass to insure uniform finishing.

The machine has four spindles and is available with three different spindle arrangements. Spindles are complete with manual flushing, and manual controlled air-operated fixture locking and unlocking. Rotation of the spindles stops automatically when spindles are raised from the mass.

Optional equipment offered includes a totally enclosed Varidrive and a processing solution collection tank with re-circulating pump, overflow, and sludge collection sump. The tank allows the reuse of processing solutions resulting in water conservation.

The machine uses either wet or dry masses employing a wide range from large and very abrasive materials to small grain sizes. It is also designed for coloring operations using chrome steel balls.



BULLETIN FAC-101

H-VW-M Full Automatic Conveyors

an album of progress in mass-production finishing . . . **electroplating, metal cleaning, anodizing, phosphating, stress relief and pickling.**

HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, NEW JERSEY

PLANTS: MATAWAN, NEW JERSEY • GRAND RAPIDS, MICHIGAN

SALES OFFICES: ANDERSON (IND.) • BALTIMORE • BELOIT (WISC.) • BOSTON
BRIDGEPORT • CHICAGO • CLEVELAND • DAYTON • DETROIT • GRAND RAPIDS
LOS ANGELES • LOUISVILLE • MATAWAN • MILWAUKEE • NEW YORK
PHILADELPHIA • PITTSBURGH • PLAINFIELD (N. J.) • ROCHESTER • ST. LOUIS
SAN FRANCISCO • SPRINGFIELD (MASS.) • UTICA • WALLINGFORD (CONN.)

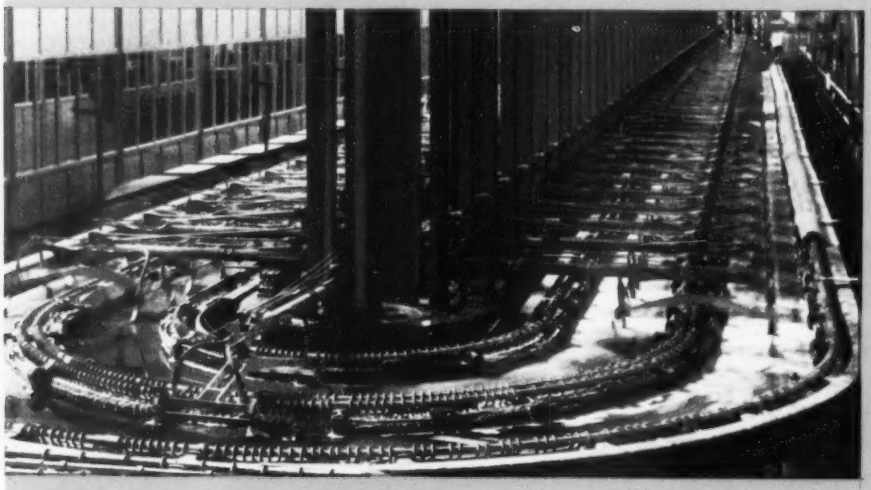
There's an H-VW-M full automatic conveyor for every production application requiring automatic cycling of individual treatments through tanks including:

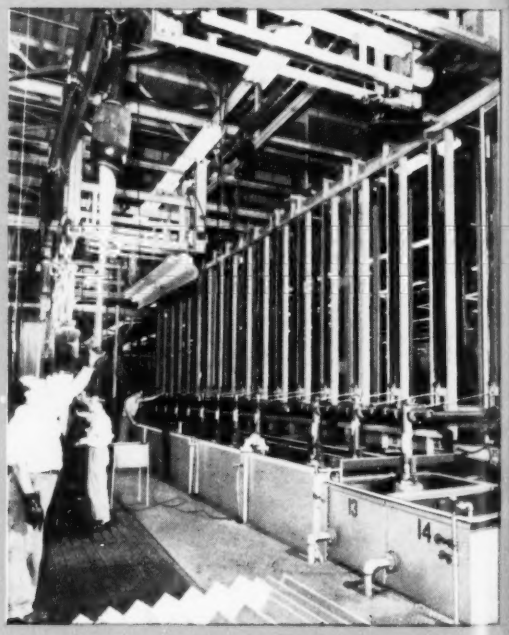
electroplating
metal cleaning
anodizing
phosphating
stress relief
and pickling

The requirements of the inorganic metal finishing industry place a premium on the operational flexibility, broad range of application, and the engineered precision of its equipment. Recognizing this, H-VW-M design engineers have placed special emphasis on incorporation of all of these features—in maximum degree—in H-VW-M full-automatic metal processing conveyors.

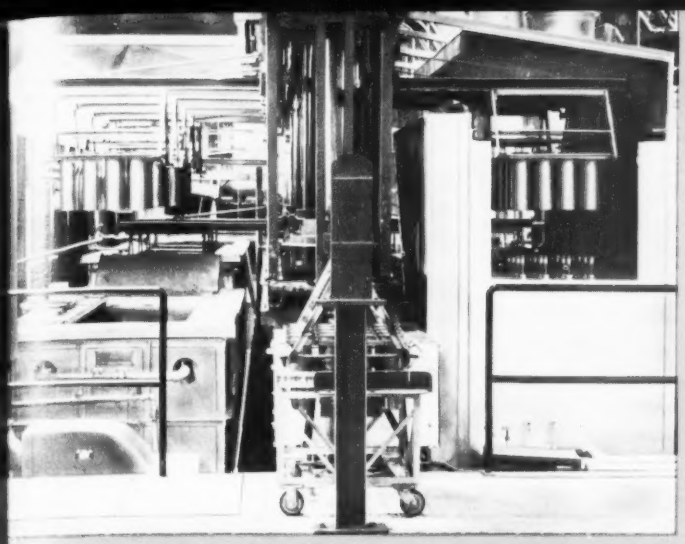
Check the following pictures and their brief story-captions carefully, for they have been particularly selected to indicate the scope of application of H-VW-M Full Automatic Conveyors. *Right here* are the performance-proved, engineered answers to a host of common problems in volume metal finishing.

from the largest to the smallest . . . in processing parts and automotive steel stampings this full automatic plating conveyor takes 'em all. This one machine has an operating solution capacity of 84,000 gallons—one of the world's largest for a single unit.

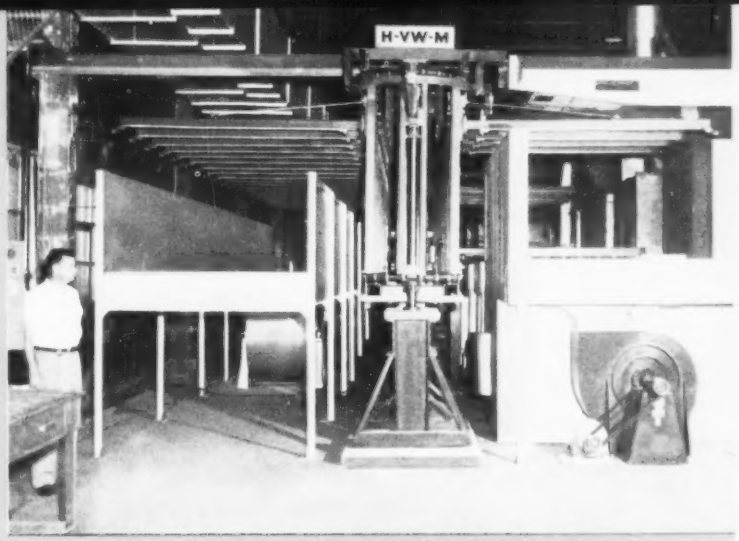




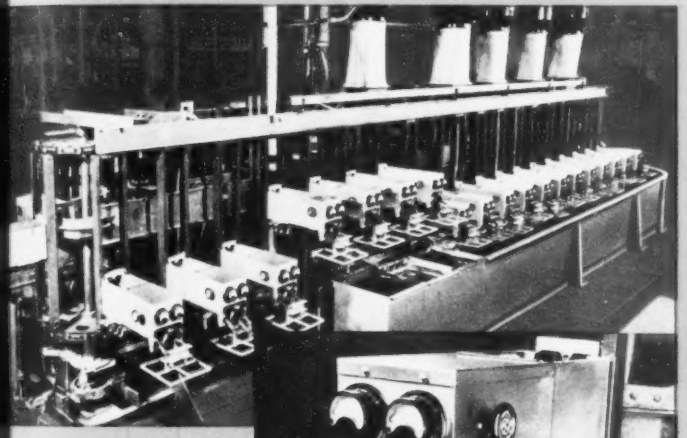
highest lift . . . for a return type conveyor, raising 300-lb. steel propeller blades a full ten feet during zinc plating cycle. To obtain correct blade balance and heavy zinc deposit, the blade transfers automatically to auxiliary conveyor chain for required recycling and automatic reload.

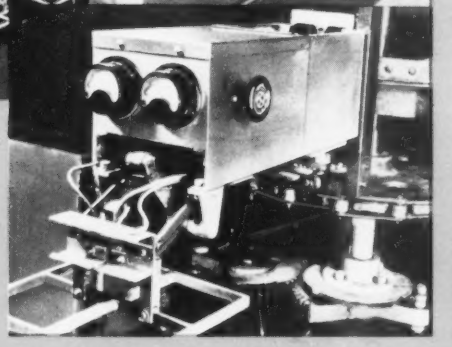


automation in stress relief . . . as well as other treatments can be accomplished through intermittent cycling, as with these steel shell cases which move between oil bath (left) and hot-air blast dryer. *Automatic loading* from and into the same truck, shown in foreground.

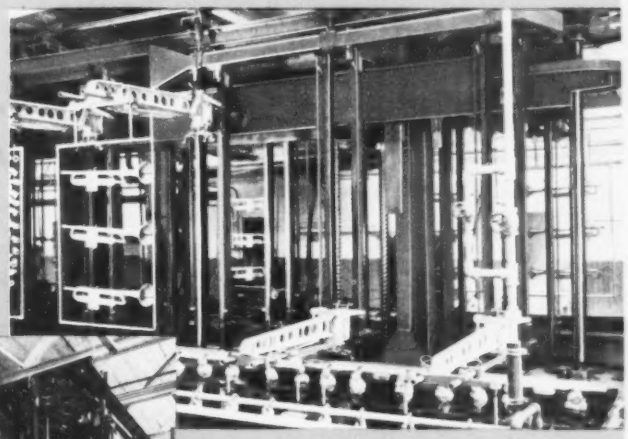


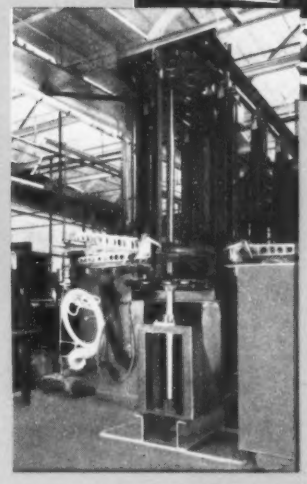
then to paint prep . . . where another H-VW-M conveyor cleans and pickles, drys and cools these same 300-lb. carrier loads of shell cases prior to spray painting. A typical return-type full-automatic does the job, loading and unloading at opposite end of conveyor. Cooler at left, 300°F. dryer at right.



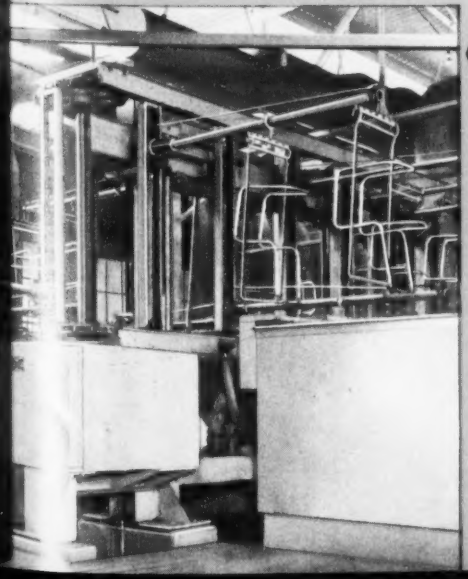


where precision is paramount . . . and minute tolerances of a uniform deposit must be maintained on each separate part, each carrier operates independently. Proper instruments, variable resistors, bi-polar circuits, and mechanical agitation of work in solution are all handled through independent controls on each carrier, as shown in inset.

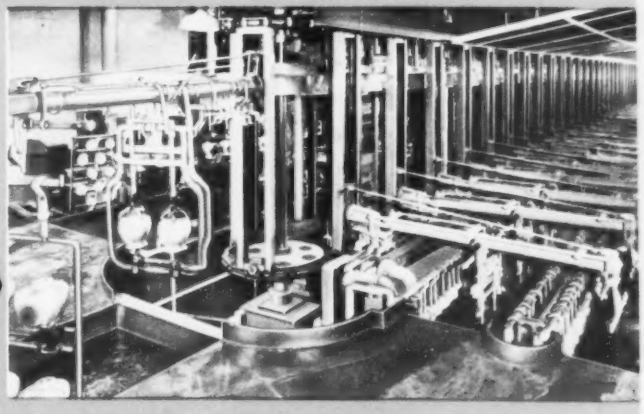




variable load capacity . . . is an essential when the same machine handles musical instruments of all shapes and sizes. Note the interior anode arrangement designed to allow complete plating of the all-important bellmouth. Inset shows a complex-shaped Sousaphone after heavy silver deposit.



adaptable for bulky loads . . . this high-lift, full-automatic conveyor handles clumsy, tubular steel furniture frames with ease. Notice the long arms, with adequate spacing between them to accommodate the bulkiest and most irregular shapes.



plating versatility . . . is the answer to the plating requirements of these attractive modern coffee makers. Like many other holloware appliances they are plated inside and outside by separate circuits. Notice the internal anode feature on the racks, and current collector fingers at the framework end of the arms.

SPECIAL FEATURES MAKE THE DIFFERENCE

Outstanding operating and construction features are the bi; reasons behind the supremacy of the H-VW-M Full Auto- matic Conveyor. Engineered for the broadest possible rang of product and treatment application, these features produc the *important* differences in conveyor operation—the cha- acteristics of versatility, adaptability, and flexibility that ar vital to high speed and high quality production.

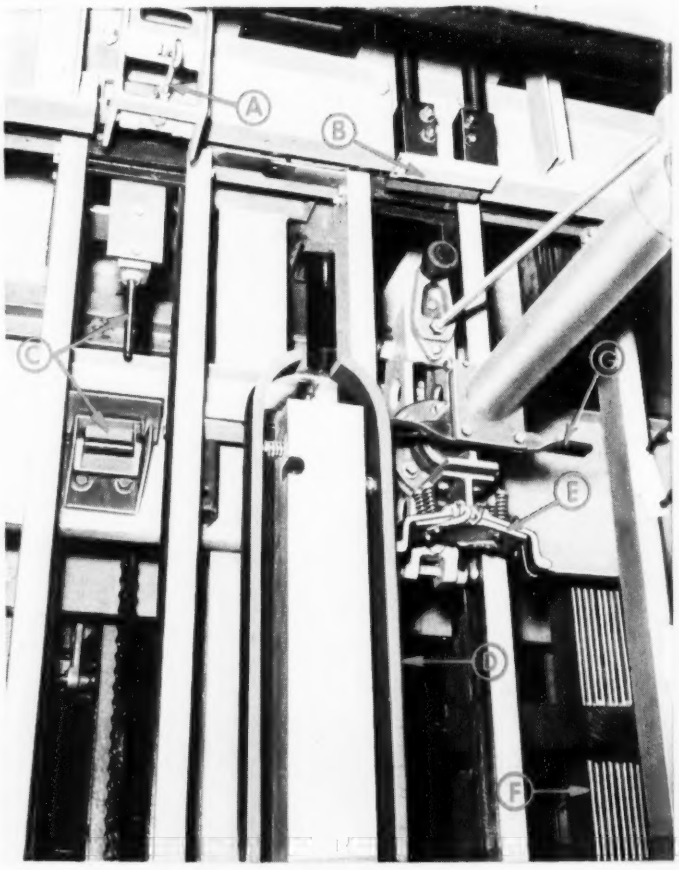
In this close-up view of the carrier arm assembly, a number of important construction features are visible.

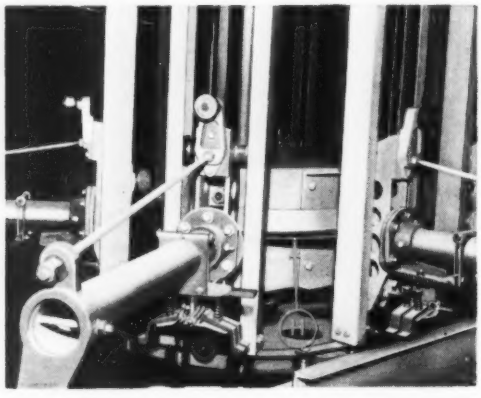
The Manual Reset Flipper (A) and the Bridge Flipper (B) set in the overhead "by-pass" track make possible the important by-pass feature of the conveyor. This feature allows carriers to skip any given station while in the elevated position. Available to operate manually or automatically, this by-pass feature provides flexibility in treatment sequences where individual steps in a process are to be eliminated. Also tanks and solution can be serviced without the need of an interruption in production because of this by-pass feature. Point (C) shows the Standard Flipper that closes to receive carrier for the vertical motion. The spring-loaded pin *positively* locks this flipper, preventing uncontrolled carrier descent.

Another feature of the equipment is the manner in which it safeguards the work from any other than the highest quality treatment. A primary factor in this respect is the special arrangement for ensuring the presence of a partial flow of current as the work approaches the bath. Hot Leads (D) are contacted by the Collectors (G) of the assembly during the vertical transfer so that the instant the work reaches the bath, true, positive plating takes place.

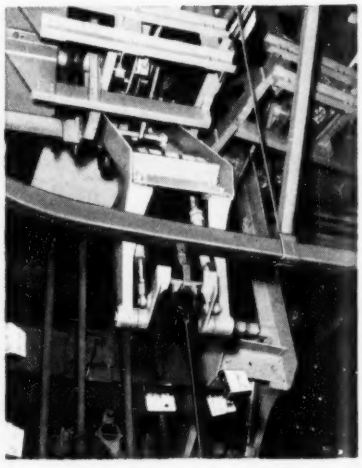
Self-lubricating and spring-tensioned, the Collector Unit (E) is used for both positive and negative DC current, either one of which may be necessary for certain plating steps in the overall operation. Baths requiring separate circuits may be stationed side by side, emphasizing the conveyor's adaptability.

An additional feature is the construction and location of the low voltage Bus Bar (F). Brought up through the center of the conveyor, it is out of the way, and its open construction permits substantially shorter bus runs.





The rugged pipe-arm carrier is shown here at the down position. Point (H), visible between two vertical channels, is the Elevator Lifting Track, a *first* with H-VW-M. Raising carriers at all transfer points by means of track or flipper makes possible a wide scope of applications unlimited by space, height, weight, or lift.



Here is how H-VW-M solved the problem of automatically transferring racks from monorail to plating conveyor, from high to lower level. Other types available for all transfer requirements.

With the H-VW-M Full Automatic Conveyor, many in-process variations are easily made involving adjustments to the work, to the carriers, to the process used, or to other parts of the conveyor itself.

H-VW-M

HANSON-VAN WINKLE-MUNNING COMPANY

MATAWAN, NEW JERSEY

***Plants:* Matawan, New Jersey • Grand Rapids, Michigan**

SALES OFFICES: ANDERSON (IND.) • BALTIMORE • BELOIT (WISC.) • BOSTON • BRIDGEPORT • CHICAGO CLEVELAND • DAYTON • DETROIT • GRAND RAPIDS • LOS ANGELES • LOUISVILLE • MATAWAN • MILWAUKEE NEW YORK • PHILADELPHIA • PITTSBURGH • PLAINFIELD (N. J.) • ROCHESTER • ST. LOUIS • SAN FRANCISCO SPRINGFIELD (MASS.) • UTICA • WALLINGFORD (CONN.)

Printed in U.S.A.

Tumbling Barrel

Tumbling Sales & Service Co., Dept. MF, King St., Greenwich, Conn.

A completely new design of heavy duty tumbling barrels, Esbec Series HD, have horizontal closed drums with total capacities ranging from 7½ to 45 cubic feet, which may be divided into two or more compartments. Special sizes can be built to fit specific needs.

The special features of these new barrels include:

Extra heavy construction. Can be used for ball burnishing as well as abrasive tumbling.

Minimum floor space in relation to capacity. Can be butted end to end.

Overhead, variable speed drive keeps entire mechanism away from dampness and abrasive.

Fast acting safety doors. The locking mechanism is one of the fastest on the market and its special design makes it impossible for the door to blow off in the operator's face, if pressure has built up during run.

Extra large, obstruction free door openings.

Low loading height, makes for easier loading, easier inspection of load.

Many safety provisions make these barrels the safest on the market, according to the above manufacturer.

Low upkeep.

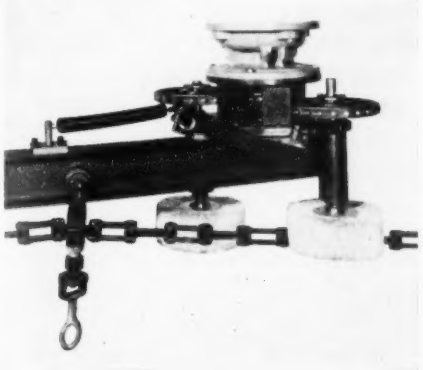
Low initial cost.

Easy to service. All working parts available from the front.

Conveyor Chain Brusher

The Fuller Brush Co., Machine Div., Dept. OF, Hartford 2, Conn.

Dust and dirt which sticks to lubricating oil on hard-to-reach overhead conveyor chains can now be automatically eliminated without work stoppage by a new conveyor chain brusher. The danger of the spoilage of material in processing from the dropping of accumulated dirt is eliminated



by two sets of Fullanchor wheel brushes which represent a new improvement in brush design.

The unit is mounted on the monorail supporting the chain conveyor, and the two brushes, powered by one 1 h.p. motor, pivot on the motor base and bear against the conveyor chain. The brushes can be swung away from the chain if cleaning is desired only periodically.

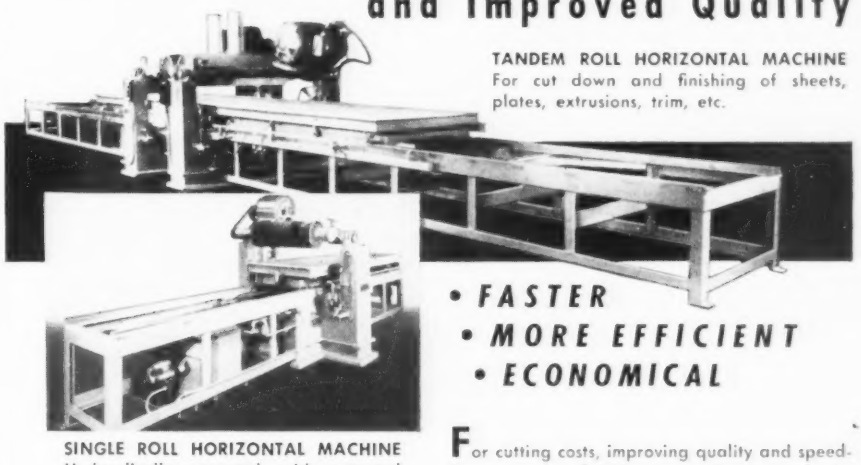
Material for the wheel brushes is selected to provide the most efficient brushing action to meet the individual problem, as each machine is "custom engineered" by the extensive research and testing facilities of the company. Tampico fiber, nylon and crimped steel wire are materials frequently used in these brushes. The fill is driven by a heavy wire staple through a continuous steel channel so that each tuft is held securely, providing strong, long wearing construction.

Abrasive Wheel

C. R. Vogt and Co., Dept. MF, 1528 Third Ave., Moline, Ill.

Neoprene permanently bonded to a cast aluminum wheel under tremendous heat and pressure, provides industry with the newest entry in the abrasive wheel field. Called the All-Four abrasive wheel, it is designed to perform equally well the four basic abrasive functions of grinding, sanding, polishing, and deburring. A constantly smooth working surface is assured with the wheel and its live rubber base serves as a cushion under the

CENTRAL Polishing Machines
Pay Big Dividends in Time Saved and Improved Quality



TANDEM ROLL HORIZONTAL MACHINE
For cut down and finishing of sheets, plates, extrusions, trim, etc.

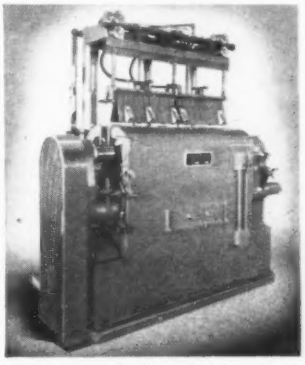
SINGLE ROLL HORIZONTAL MACHINE
Hydraulically operated, with patented hydraulic contour device. Tables on all machines may be oscillated sidewise.

• FASTER
• MORE EFFICIENT
• ECONOMICAL

For cutting costs, improving quality and speeding up your finishing operations on sheets, plates, extrusions, rods, tubing, auto trim and many odd-shaped pieces, Central Polishing Machines will meet every production requirement as they have done so successfully wherever they have been installed.

Horizontal Machines are built in single and tandem roll models, 30", 40" and 50" widths, in any length. Are hydraulically or electro-hydraulically operated from a central operator's station and equipped with our patented hydraulic contour control. Stroke adjusted from 2" to full capacity in stepless increments. Tandem rolls permit cut down and finishing operations with one set-up.

Vertical Machines are available with 18" or 36" stroke. They are fast, economical and easy to operate. Patented hydraulic contour device permits finishing many different shapes such as hardware items, handles, cutlery, auto and appliance trim, escutcheon plates, etc. Central Vertical Machines may be set in batteries where a sequence of operations is desired. Conveyor systems and fixtures can be furnished.



VERTICAL POLISHING MACHINE
2 sizes, 18" and 36" stroke. Hydraulic contour device. Gives a high finish to many odd-shaped pieces.

Write for full information or send us samples of work to be finished.

CENTRAL MACHINE WORKS
74 Commercial St. Tel. PL 6-1500 Worcester 8, Mass.

NO ANODE SLUDGE

with NEW Anaconda "PLUS-4" ANODES*

(PHOSPHORIZED COPPER)

WHY PLATING COSTS LESS!

+1 no sludge

+2 no copper "build-up" in solution

+3 smoother, denser cathode deposits

+4 up to 15% *more* cathode deposits

CORRODED ANODES

Phosphorized Copper | Fire Refined Copper | Electrolytic "Tough Pitch" Copper

"Plus-4" Anode, far left, shows even, uniform corrosion. Irregular corrosion shown by other two anodes results in high scrap loss.

*For use under Patent No. 2,689,216

Here's a new copper anode for acid copper plating which eliminates "sludging off" of copper particles to form sludge in the tank, "build-up" of copper in the electrolyte, and cathode roughness due to lodgment of copper particles. No "bagging" or diaphragms are required.

In addition to overcoming these troublesome and costly acid copper plating problems, "Plus-4" Anodes plate more copper per pound of anode and corrode to a small, compact "fish" with considerable saving in scrap. "Plus-4" Anodes are furnished in all standard sizes and shapes and cost no more than ordinary rolled copper anodes.

SPECIAL TRIAL OFFER — for details on how you can get enough "Plus-4" Anodes to fill one tank, write to *The American Brass Company, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ontario.* 55143

"PLUS-4" ANODES
AN
ANACONDA®
PRODUCT
made by
THE AMERICAN BRASS COMPANY

abrasive cloth as well as preventing slippage. Chipping, grooving, and exploding problems are ended and a special locking device ends abrasive cloth fly-off. The wheel cuts down-time to a minimum and eliminates dressing.

Air Pump

Leiman Bros., Inc., Dept. OF, 102 Christie St., Newark 5, N. J.

The above firm announces a higher-capacity model in its recently developed line of integral air pump and motor units. Designated as Model K-3, the new size provides 28" Hg. continuous vacuum, 20 lbs., pressure and has 7.2 c.f.m. displacement. Overall size is 18½" long, 15" wide and 7" high. The unit features a ball bearing motor and rotary pump, with a cast iron housing and two steel blades with patented automatic adjuster to insure constant blade-to-wall contact for long, uninterrupted service. It is

fan-cooled and mounted on rubber silencers. The motor equipped with automatic thermal overload protection, and the ball bearing greasing system is said to require attention only once every 90 days. A patented E-113 automatic lubricator operates 60 to 80 hours before requiring filling. An inlet filter and outlet separator are used and provide oil-free air. A smaller Model K, with same construction features, provides 28" Hg. continuous vacuum, 20 lbs. pressure and 3.6 c.f.m. displacement, with overall dimensions of 13½" long, 12" wide and 7" high.

Sump Filter Pumps

Sethco Mfg. Co., Dept. MF, 70-78 Willoughby St., Brooklyn 1, N. Y.

For filtering expensive solutions such as silver, gold, rhodium and palladium electroplating solutions, where loss of any liquid cannot be tolerated, the Sethco sump filter pumps consist of a sump pump, a tank and a filter assembly.

The sump pump is mounted in the tank and completely insulated from it. The filter assembly is connected to the pump through an opening in the side of the tank. The sump pump is self priming and inasmuch as it is immersed in the liquid being pumped, there can be no loss of liquid.

The choice of materials is such that unlimited application is possible.

The sump pump can be plastic or stainless steel. The tank can be plastic, stainless steel or rubber lined steel, and the filter assembly is high temperature Lucite, rigid vinyl, polyethylene, epoxy, Teflon, Saran, Haveg, stainless steel or rubber lined.

Model L.S.I.-10ST, shown, is rated

at 100 gallons per hour. The tank will hold 4 gallons of liquid. This tank can serve as a sump catching the overflow from a larger tank, or it can be used as the actual plating tank. The size of the tank can be varied to meet any application.

Flexible Tip Blow Gun

Teglen Engineering Co., Dept. MF, 1209 Fair Oaks Ave., South Pasadena, Cal.

A low-priced, highly efficient flexible tip blow gun, that operates with only slight fingertip pressure and completely eliminates air loss, is controlled by manual flexing of the nozzle. It can be easily manipulated to produce any amount of air, from gentle puffs to

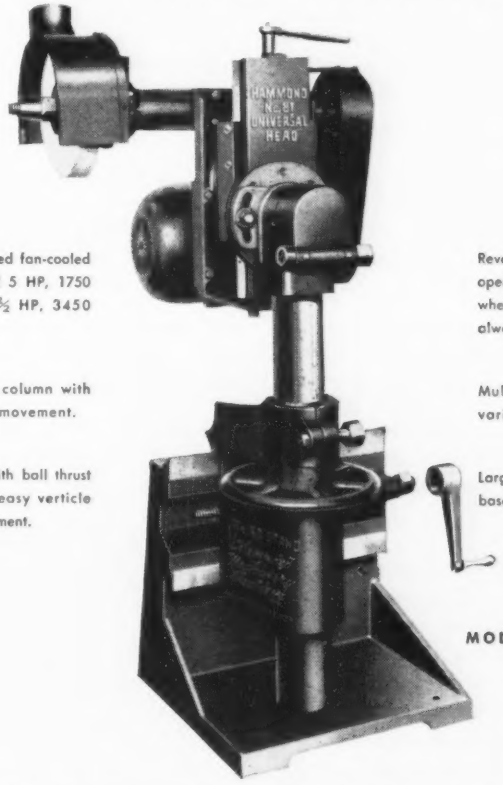
strong blasts in any direction. Until the Flex Tip gun is flexed, the entire air line pressure is forced against a fully protected internal valve seat assuring a positive, leakproof seal.

Without external working parts, the gun's operating life is more than double that of conventional blow guns. Sturdily constructed of steel, brass and neoprene, it can be dropped, bumped or even mishandled without damage or impairment of efficiency. It is small enough to be handled instantly in any position with one hand by either men or women operators, without groping for handles or push-buttons.

Other advantages of the blow gun: less expensive than conventional blow guns; streamlined design for maximum safety; trouble-free life assured because oil, grease, filings or other shop matter can't reach the internal valve mechanism. Available in ¼-inch or ½-inch sizes.

Hammond of KALAMAZOO

FOR THE RIGHT FINISHING HEAD



Totally enclosed fan-cooled motor (3 and 5 HP, 1750 RPM and 7½ HP, 3450 RPM).

Sturdy steel column with 14" vertical movement.

Handwheel with ball thrust bearing for easy verticle column adjustment.

Reversible ratchet wrench operated dovetail slide feeds wheel to work on "once set-always set" angled head.

Multi-V-belt drive permits various spindle speeds.

Large, extra heavy cast-iron base with anchor bolt holes.

MODEL 50-81

1½ HP to 25 HP — Floating or non floating types for use with buffs, wire or tampico brushes or abrasive belts. Accessories include AIR LIFT — POWER WHEEL FEED — POWER TRAVEL (VERTICAL OR HORIZONTAL) OSCILLATING SPINDLE. Tell us your problem and let us quote on your requirements.

Hammond Machinery Builders INC.

1601 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

SEE US AT BOOTHS 370-371 — INDUSTRIAL FINISHING SHOW

Sweatbands

Pulmosan Safety Equip. Corp., Dept. MF, 644 Pacific St., Brooklyn 17, N. Y.

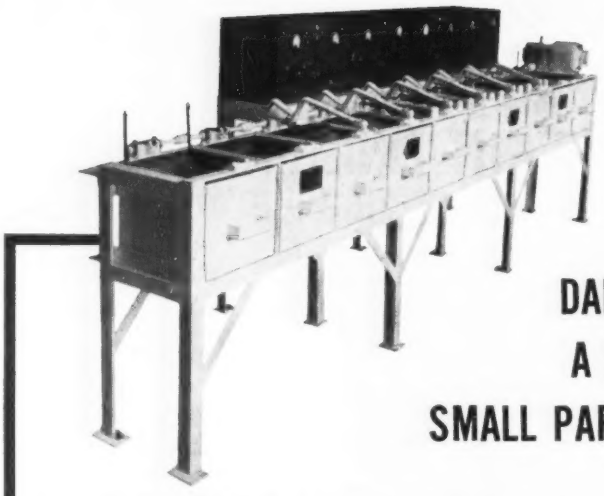
New Aircool sweatbands are made of perforated pure foam rubber, reinforced with a cotton backing. The

perforations aid evaporation of water and circulation of air. Elastic headbands are adjustable. The rubber body is durable, tear resistant, soft and resilient, according to the above manufacturer.

Polyethylene Floats

Cosom Industries, Inc., Dept. MF, 6012 Wayzata Blvd., Minneapolis 16, Minn.

Small polyethylene balls are now available to be spread over the surfaces of solutions which evolve fumes or spray. The balls float on the surface and break up bubbles which rise during pickling and electrolytic operations. They also act as a solution cover, cutting down spray losses and evaporation.



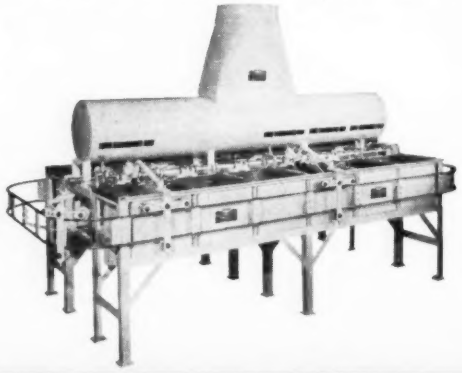
DANIELS

DANIELS PLAYS
A BIG PART IN
SMALL PARTS PLATING

Packaged plating plants for small parts work — completely self-contained and ready for operation — yet custom engineered to meet a wide variety of needs, are now available at DANIELS.

Designed for return-type or straight-line operation (see photos), the DANIELS *Packaged Platers* permit complete plating cycle or multiple cycles with station by-pass through the unique *Trolley and Transfer*.

DANIELS *Packaged Platers* are complete, including power supply, water lines, heating equipment and controls, waste controls and exhaust hoods and ducts where required.
Write for complete information.



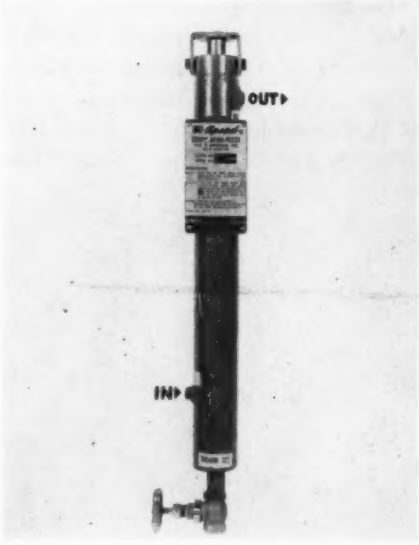
DANIELS PLATING BARREL & SUPPLY CO.
Electroplating and Polishing Equipment and Supplies
129 Oliver Street, Newark 5, N. J. • Tel. MArket 3-7450

Dehumidi-Filter for Compressed Air Systems

Van Products Co., Dept. MF, 5759 Ridge Road, Erie 7, Pa.

A new Model 5 Vi-Speed Dehumidi-Filter for compressed air systems is now in production. Designed with a maximum capacity of 5 s.c.f.m. at 100 p.s.i.g., it fulfills the many requirements for a highly efficient low volume filter on instrument air lines. Operating range is from 60 to 150 p.s.i.g.

By removing all contaminents, including the dangerous oil and water vapors, the filter assures efficient operation of the instruments or other low volume pneumatic equipment, and reduces costly maintenance at very little expense. The pure, clean, vaporless air also increases the life expectancy of all pneumatic equipment.



Polishing Head

Wyzenbeek & Staff, Inc., Dept. MF, 223 N. California, Chicago, Ill.

The above firm announce that they now are in production on a new quick-change angle head which features thumb controlled water feed, fully protected copper feed line, adjustable wheel guard, and precision ball bearings. The quick-change feature permits the user to rapidly and easily change from coarse to fine wheels or to a straight handpiece as required.

These angle heads are designed for use with WYCO flexible shaft grinders.

High Lift Truck

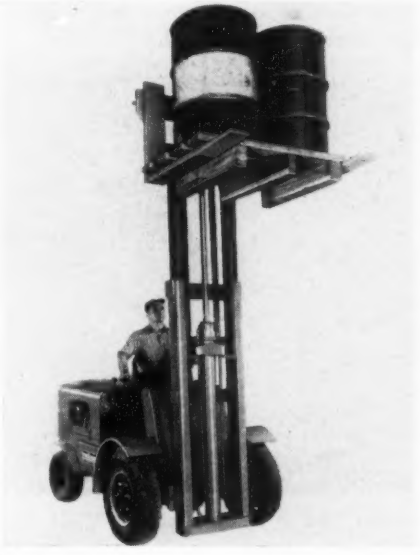
Truck-Man Div., Knickerbocker Co., Dept. MF, 632 Liberty St., Jackson, Mich.

An improved mode of the company's two ton outdoor high-lift truck, similar to the previous Model 40, features many improvements.

A new transmission with 4 speeds forward and reverse delivers speeds up to 20 mph. The time required for long runs is shortened and the need for turn-arounds eliminated. Six inches of free lift make it easier to load enclosed trucks or box cars. The mast is fabricated of channels rolled especially for lift trucks for added life and efficiency. Power is supplied by a 40 hp., 4 cylinder, valve in head, Ford industrial engine. Standard Ford parts, available through any Ford garage, are used extensively throughout the truck.

In addition, the model Y-40 may be specified with either a wide or narrow axle, single or dual drive wheels and

various fork styles depending on requirements. Tires on drive wheels are 7.50 x 15 for maximum traction. Other features include a new tilting mast, oversized Ford clutch, heavy duty Timken drive axle, and ready access to all wear parts. A hydraulic side shifter



(3½" each way) and other attachments are available as optional equipment. Standard lift is 108" but others are made to order.

Barrel Hook

Ampco Metal, Inc., Dept. MF, 1745 South 38 St., Milwaukee 46, Wis.

This new all-position barrel hook has a sliding ring which can be locked between links. This feature allows the drum to be either lifted or tilted for emptying. Overall length of the hook is reduced from 47" to 42" providing for greater head-room when loading or unloading drums from storage racks.

A satisfactory safety factor has been allowed above the 1,500 pound safety test given each hook by the company.

The new barrel hooks are made completely of Ampco Metal, a strong, durable, spark-resisting alloy. Their principal use is for handling drums of flammable or explosive materials, such as—paints, lacquers, thinners, high octane fuel, acetone, naphtha and many others.

Floor Patch

The Medal Brick & Tile Co., Dept. MF, Wooster, O.

A new ready-mixed, instantaneous floor patching material, called Jet-Roc, that can be subjected to heavy factory traffic immediately after application, is suitable for use in repairing concrete, brick, mastic or composition floors. The above manufacturer advises that it contains no asphalts, cements or dehydrators and is chemically inert. Application consists of simply priming the floor hole, filling with the material just as it comes from the package, and tamping or rolling.

The product is reputed to be resistant to oil, gasoline, grease, water, and many acids. It is recommended for both indoor and outdoor use. Other features include resiliency and the absorption of traffic shocks and noises. It is said to be skid-proof, easy to clean and non-glaring.

The compound is available in 5 gal. cans, 30 and 55 gal. drums.

FORMAX

the Perfect Combination

FROM START TO FINISH

ZIPPO CLOTH BUFFS

These famous long-wearing buffs run cool under all buffing conditions. High count bias-cut cloth is assembled on ventilated steel centers. Each section is perfectly balanced and faced—requires no raking.

BUFFING COMPOUNDS

Formax produces a complete line of buffing compounds in bar, tube and liquid form.

Our extensive manufacturing, laboratory and testing facilities are at your disposal.

ZIPPO SISAL BUFFS

You have a pleasant surprise coming if you haven't tried the new Zippo bias-type sisal buff. It was specifically developed for steel buffing—to blend polishing grit lines—to cut down stainless steel—and bring up a bright lustre.

Other Formax products include the well-known C-20 Flexible Contact Wheels and F-26 Abrasive Belt Grease Stick.

Descriptive Catalogs Sent on Request

FORMAX MFG. CORP.

DETROIT 7, MICHIGAN

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Perma-Line corrosion and erosion resistant products and services have, for many years, solved corrosion problems in various industries at a reasonable cost.

Our experienced technical staff is prepared to help you solve those corrosion "bottle-necks" that slow down production in your plant or field operations.

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Perma-Line Corrosion-Resistant Services and Products include:

Plant and Field Installations • Metal and Rubber Fabricated Parts • Tank and Tank Linings • Perma-Coil Heat Exchanger Coils • Ventilation and Exhaust Systems • Pipe and Fittings • Brick and Mortar • Perma-Plugs • Plating Accessories • Anode and Industrial Baskets • Coatings and Paints

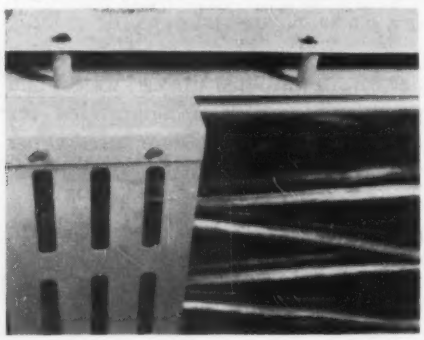
Perma-Line PRODUCTS

PERMA-LINE RUBBER PRODUCTS CORPORATION
1753 No. Winnebago Ave. • Chicago 47, Illinois • Tel. HUmboldt 9-2020

Solid Plastic Tank Guards

Heil Process Equip. Corp., Dept. MF, 12901 Elmwood Ave., Cleveland 11, Ohio.

New solid plastic tank and coil guards constructed of Rigidon (glass re-inforced polyester) and Rigivin (rigid vinyl plastic) offer features previously unobtainable, according to the manufacturer. Being chemically resistant throughout, there is no possibility of premature failure through metal exposure after coating peel, as has been the case in coated metal guards. Lower initial cost and extended life expectancy is assured with guards constructed from either material.

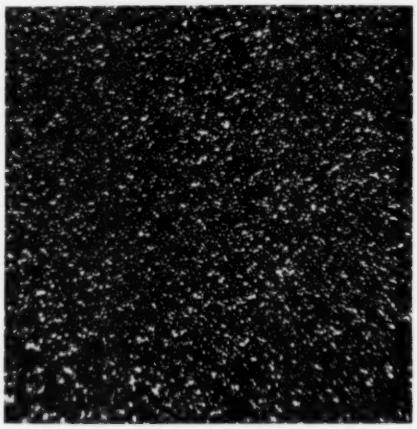


Slotted type and lattice type guards are available in standard sizes for use as side-wall or tank bottom guards. These guards will minimize mechanical abuse to tanks and coils and, being electrical insulators, will reduce scrapped work from direct shorts. Anode saver baskets and other specialty items incorporating the slotted or lattice standard designs can be supplied to exact requirements.

Crack-Free Chromium Plating Process

United Chromium, Inc., Dept. MF, 100 East 42nd St., New York 17, N. Y.

A new production plating process deposits a chromium plate which provides much better resistance to corrosion than ordinary chromium directly on steel, it is claimed.



Surface view of etched deposit of Crack-Free Chromium. The surface is free of imperfections. It is microscopically irregular, due to its being deposited dull.

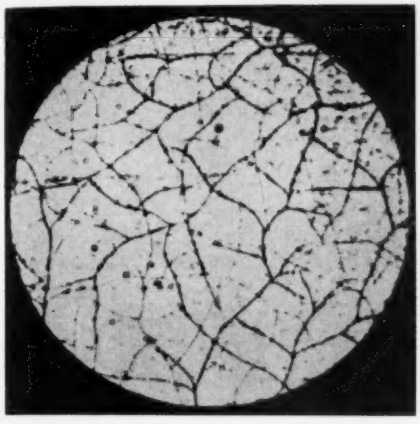
Called "Crack-Free Chromium," the new plate is deposited free of any structural imperfection that would allow corrosive materials to come in contact with the underlying surface being protected. As a result, it can be plated directly on steel, without the necessity for an undercoat of nickel or copper and nickel.

Other desirable properties of the deposit produced by the new process include low coefficient of friction, excellent adhesion, a non-galling surface and superior ductility as compared to ordinary chromium finishes. The crack-free deposit has an attractive light gray matte appearance. It can be readily buffed to a high luster.

Plating is done with a special chromic acid type bath having automatic regulation of the catalyst concentration. Standard plating equipment and procedures are used. The bath is prepared by simply dissolving the proper amount of a single compound, Unichrome SRHS Compound CF-500, in water. The same compound is used for maintenance. According to field reports, the bath is easy to operate and maintain. The bath has good throwing power. Its plating speed is about the same as that of ordinary chromium.

A summary of the properties claimed for the deposit follows:

1. Much better corrosion resistance than ordinary chromium plated directly on steel.
2. Remains crack-free when heated to 1000°F. and plunged into water.
3. Softer and more ductile than ordinary chromium (500-700 Knoop as compared to 800-1000 Knoop hardness.)



Surface view of etched deposits obtained from various types of chromium plating solutions now in production use. The design somewhat resembles a mud flat in that there are cracks surrounding relatively large areas unaffected by the etching.

4. Excellent adhesion.
5. Improved non-galling, non-seizing and leveling properties.
6. Plated directly on steel, it can provide the same protection as the commonly used composite copper-nickel-chromium decorative finishes.

In addition to industrial applications where corrosion and wear resistance, good adhesion and ductility are required, the new process holds promise for decorative chromium finishing.

Where a non-reflective finish is required, crack-free chromium would be effective since the unbuffed deposit is a light gray matte. For most decorative applications it is necessary to buff if a high luster is to be obtained. However, the buffing operation is not prolonged or heavy but rather similar to buffing dull nickel plate. The savings resulting from the reduction or elimination of the undercoats, as well as the improved product appearance and service life more than balance the cost of the extra buffing operation, according to the company's field engineers.

Abrasive Belt Polisher

Anchor Machinery Co., Dept. MF, 229 W. Orange Grove Ave., Burbank, Calif.

In the new Superspeed belt grinder and sander belt speeds in excess of 10,000 sfm have resulted in 300% higher production with an amazing increase in belt life, up to 3000% with standard abrasive belts, over usual slower speed operation, it is claimed. Previously discarded belts have been reused with efficiency. At super speeds, belts resist loading, even with non-ferrous and non-metallic materials. Operators report smoother operation with less work pressure and an absence of any "bumping" tendency ordinarily due to loading.

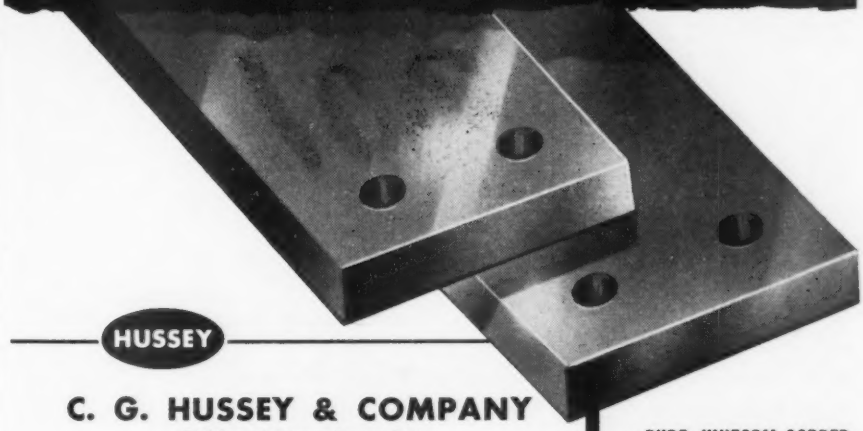
Model #150, currently being offered by the manufacturer, uses the popular 1½" × 60" belt. The machine is compact in design, utilizing less than 1¾ square feet of floor space. Removable, graphited platen and adjustable tool

There is a difference!

HUSSEY

Plating Quality

COPPER ANODES



HUSSEY

C. G. HUSSEY & COMPANY

(Division of Copper Range Co.)

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SEYMOUR

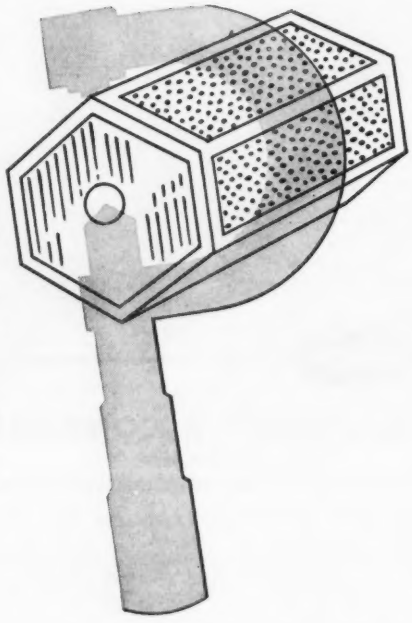
BRIGHT NICKEL

FOR PLATING TO SPECIFIC THICKNESSES

Seymour "NC" and "CK" Bright Nickel processes in a warm plating bath permits specification barrel nickel plating to any desired deposit from .0002" to .0010" at speeds four to six times faster than a cold solution.

Seymour Barrel Nickel Brightener solutions are also available for cold plating baths where decorative deposits of about .0001" maximum are required.

Simple to maintain and easy to control, Seymour brighteners permit chromium plating without prior buffing or wiping.



THE SEYMOUR MANUFACTURING CO.
SEYMOUR, CONN.
Nonferrous Alloys Since 1878

rest are standard equipment. One piece, double row, sealed bearings are used. Contact wheel is precision ground and balanced for super speed operation. Belt angle is adjustable over a full 90°. Belt changing requires no readjustment, with automatic take-up and positive tracking.

The machine is manufactured in bench and pedestal models, equipped with either ¾ or 1 HP, 115 V or 230 V, single phase or ¾, 1 or 2 HP, three phase.

Anti-Tarnish Paper

Daubert Chemical Co., Dept. MF, 333 N. Michigan Ave., Chicago 1, Ill.

A new packaging paper has been designed specifically for the prevention of tarnish on silver, according to the manufacturer. This new paper product, called Nox-Tarnish, is chemically treated and should not be confused with neutral or so-called "anti-tarnish" papers now on the market.

Silver tarnish is produced by sulfides present in the atmosphere. The chemicals impregnated in paper neutralize these sulfides thus preventing their action upon silver. Tests by leading producers of silver and silver-plated products reveal that the paper has a great capacity for neutralizing sulfides, and thus will provide long term protection.

It can be used for the protection of hollow ware, flat ware, trophies, jewelry, bearings, and electronic components. While retention of the bright surfaces of table ware is very important, a major use of the paper is on electrical components. Presence of tarnish on these items impairs proper soldering.

Midget-Size Plating Barrel

Hardwood Line Mfg. Co., Dept. MF, 2022 N. California Ave., Chicago 47, Ill.

With cylinder dimensions of only 4" × 6", accomodating about 2½ pounds or ½ pint, this new barrel handles as easily as a plating rack and is particularly adaptable to still plating.

The Minim barrel steps in where the larger size portable plating barrel is found to be impractical because of small load.

A single hook on the barrel, similar to a plating rack, makes it as practical a unit as the large size barrel. The manufacturer states that the standard 1/16" perforations, being extremely close together, plus the thin diameter of the Lucite, delivers as high a quality and plating speed as any barrel having a 3/16" perforation.

It lists for only $78.00 and has a single-phase gearhead motor of 110-v, 60 cycles. Over-all dimensions are 9" long, 7" wide and 17" high. The unit is now in production.

Vinyl Protective Coating

Amercoat Corporation, Dept. MF, 4809 Firestone Blvd., South Gate, Cal.

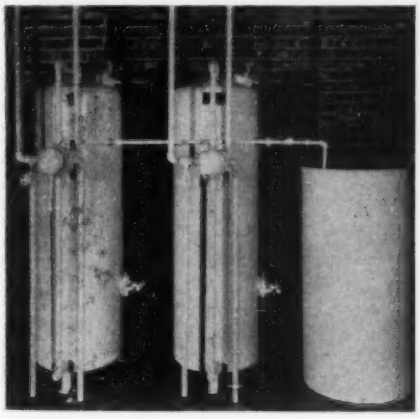
A new vinyl protective coating that

makes possible a sharp reduction of labor costs, Amercoat No. 87, can be applied at a thickness of 10 mils in a single double-pass spray coat, thus providing a dense, heavy film that was previously obtainable only by multi-coat applications. According to the company, this vinyl mastic produces its unusual film thickness without sacrificing the chemical and moisture resistance for which vinyls are so well known.

Although the product has double the solids content of standard vinyl resin paints, the coating is easily applied with conventional industrial spray equipment. An additional feature is that the coating does not flow away from edges and sharp corners as do ordinary paints, and therefore provides extra protection for such areas which are normally more vulnerable to corrosive attack.

Small Zeolite Water Softeners

Industrial Filter and Pump Mfg. Co., Dept. MF, 5900 Ogden Ave., Chicago 50, Ill.



New model zeolite water softeners are made in 13 standard sizes with flow rates from 6.5 to 40 gallons per minute. These flow rates will satisfy demands for small volumes of soft water.

These Industrial zeolite water softeners are of simple design for convenient operation through a single multiport valve. They can be supplied with either automatic or semi-automatic controls. In automatic operation, the steps of backwashing, brining, rinsing, and return to service are carried out automatically without operator's attention. With the semi-automatic operation, initiation of the regeneration cycle is controlled by push button.

ROTO FINISH
your new opportunity in controlled precision finishing
Roto-Finish processes are controlled precision finishing operations using low cost mass production techniques, which maintain exact tolerances on most any size or shape precision part with no significant dimensional changes. Roto-Finish speeds production, cuts maintenance expense, minimizes operational costs, yet produces top quality finishing results. Roto-Finish offers latest in controlled methods, materials and special purpose fixture equipment. Roto-Finish is your new opportunity in controlled precision finishing with guaranteed results!
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P. O. Box 988
Phone 3-5578
visit our booth
No. 394 at Industrial Finishing Exposition,
June 20 - 23 at Cleveland Public Auditorium

Rubber Bonded Polishing Wheel

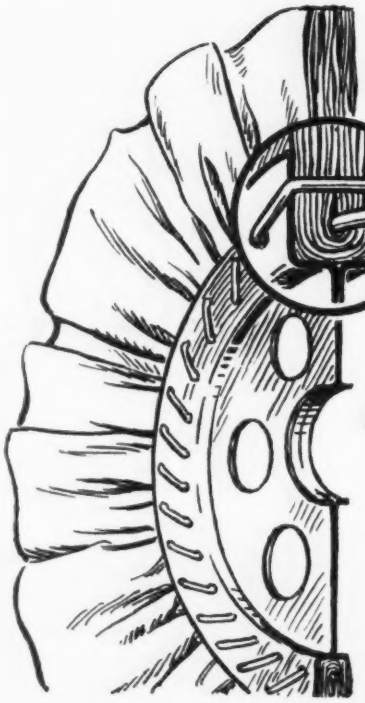
Sandusky Abrasive Wheel Co., Dept. MF, Sycamore, Ill.

A new line of standardized Sawco polishing wheels that permit high speed polishing with an extra margin of safety includes four types of rubber bonded wheels to meet a wide range of polishing jobs. Leader in the new line is the PRH wheel which is a dense, long life wheel for polishing and removing tool marks in hard steels and alloys. Other wheels include the Stan-Pol for general polishing and de-burring, the Qik-Pol for extra fast polishing and the Hi-Pol, a wheel especially designed for precision polishing and cleaning.

Because of the high strength rubber bond, these polishing wheels may be operated at higher speeds common to many bench and portable grinders, while maintaining a wide margin of safety, according to the manufacturer. For example, a 6 in. PRH Wheel is rated for 6,000 R.P.M. operation, almost twice the speed of most bench polishers. This feature permits faster polishing without endangering workers.

The polishing wheels are self-dressing and non-loading. They may be shaped for polishing irregular surfaces and contours. The line also includes custom-made rubber-bonded and resin-reinforced, rubber-bonded grinding and cut-off wheels, abrasive sticks and blocks, and small mounted wheels.

BARKERMATIC



METAL CENTER BIAS TYPE BUFF

HIGH TENSILE STEEL STAPLE

WELDED STEEL RETAINING RING

STEEL PLATE ON EACH SIDE

STRONGER BY ACTUAL TEST

Yes, up to twice as strong!

Actual tests by an independent testing laboratory proved that the Barkermatic held together under almost double the load required to pull other buffs apart.

Barkermatics in production buffing are doing jobs with safety where other buffs have ripped loose from the center.

WHY ARE BARKERMATICS STRONGER?

The Barkermatic does not rely on small teeth part way through the cloth. In the Barkermatic the cloth is secured to the center by a solid fastening that goes completely through steel plates on both sides of the cloth. This type fastening cannot bend out and release the cloth while running at high speeds. Extra protection is provided by a steel retaining ring in the center assembly. The Barkermatic ***cannot*** fly apart.

AVAILABLE IN ALL SPECIFICATIONS

WRITE FOR OUR COMPLETE CATALOG.

PROMPT SHIPMENT ON MAIL ORDERS.

For added safety "USE BARKERMATICS"

BARKER BROTHERS INC.

ESTABLISHED 1911

1660 Summerfield Street Brooklyn 27, N. Y.

BUSINESS ITEMS

Battelle Appoints Dr. Munger

Dr. Hamnett P. Munger has been named a technical advisor at *Battelle Memorial Institute*, Columbus, Ohio. In his new position he will advise both the Institute and its clients on pilot-plant and large-scale studies in chemistry, mechanical engineering, metallurgy, and related fields.

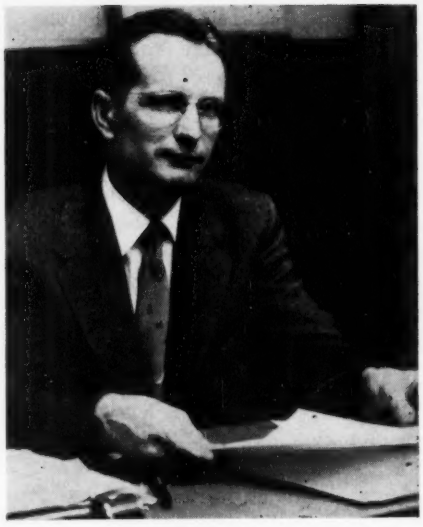
Dr. Munger's appointment follows closely completion of the first units of Battelle's facilities for an expanded program of pilot-plant research for American industry. Those facilities include buildings specifically designed for large-scale experimental work and ample water, natural gas, and electric power to meet any foreseeable pilot-plant need.

Dr. Munger possesses twenty-five years of varied industrial and engineering experience. He joined the staff in 1948.

Rapid Electric Announces Personnel Changes

Recent expansion into the germanium rectifier field has made necessary personnel changes at *Rapid Electric Company*, 2881 Middletown Road, Bronx 61, New York, manufacturers of D.C. power supplies.

William E. Bryan has been named Director of Sales. Mr. Bryan came to



William E. Bryan

Rapid from American Machine and Metals, Inc., New York. Prior to that he was Vice-President of Surveyors Company, Inc., Washington, D. C. He was also associated with Bendix Aviation Corporation and Sperry Gyroscope Company.

Eugene A. Cooney

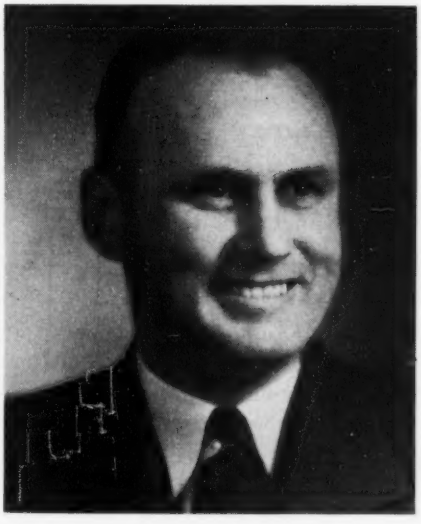
Eugene A. Cooney will be Director of Purchases. Mr. Cooney was for many years with Gulf Oil Corporation, New York and was formerly associated with S. Alexander Company, New York as Warehouse Superintendent. Mr. Cooney is a Captain in the U. S. Army Reserve having seen active service in the European theater in World War II.

Canadian H-VW-M Elects President and Appoints General Manager

Elected president of *Canadian Hanson & Van Winkle Co., Ltd.*, Toronto, Can., *William Whalen* started as a salesman with the company in 1921. He is well known in the metal finish-

William Whalen

ing plants of Western Ontario where he solicited business for his company for several years. Mr. Whalen's successful efforts in sales led to various executive appointments which enabled him to contribute much to the growth of the company. He was elected vice-



Arthur C. West

president and general manager in 1945 and held this office until his election as president.

Arthur C. West was appointed general manager of the company. He graduated in chemical engineering from University of Toronto in 1933 and joined the staff of Canadian Hanson and Van Winkle Company Limited in 1934. Starting as chemist he progressed to chief chemist and has held the office of assistant general manager since 1945.

Wagner Brothers Contest to Name New Standard Automatic Plater

The new standard full automatic plating machine being demonstrated at the 1955 Industrial Finishing Exposition by *Wagner Bros., Inc.*, is complete in every sense, that is, except for a suitable name. For this reason, the company is conducting a "Give Me A Name" contest, with the winner to be awarded a complete set of custom high fidelity audio equipment (including speaker cabinet, turntable with pickup, amplifier with remote control, tape recorder). The winner will be announced at the conclusion of the exposition at the Cleveland Public Auditorium, on June 23rd.

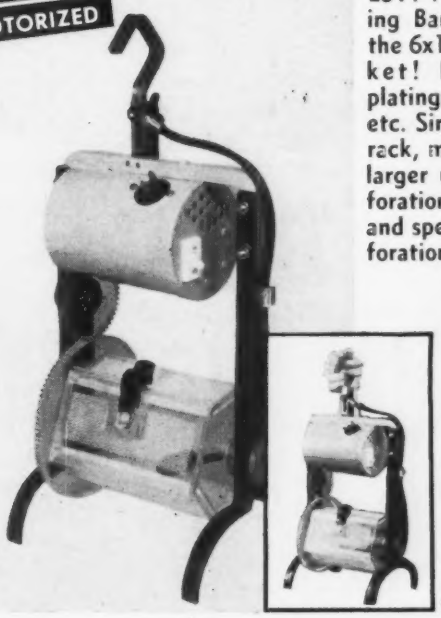
Anyone attending the show is eligible to enter the contest. Official contest blanks and literature describing the new mechanism are available at Booths 488-504 in the auditorium. The contest closes at 2:00 p.m. on June 23rd and all entries must be made by this date to be considered. Contestants may submit as many entries as they wish —there is absolutely no obligation. Judging will be done by a committee composed of leading representatives of the plating industry, Wagner Bros. and Bingham Technical Advertising.

Buckeye Appoints Baker Distributing in Cleveland

Charles Wise, secretary of The Buckeye Products Co., Cincinnati, announces that the *Baker Distributing Co.*, 1105 W. 11th St., Cleveland, will carry the complete line of Speedie buffing and polishing compositions in the Greater Cleveland and Toledo areas. Long known in metal finishing circles in these two prominent Ohio

LAZO PLATING BARRELS
Announce the NEW 1-BM MINIM Barrel
4 x 6 Inches!
Only $78
f.o.b. Chicago

SMALLEST EVER
LIFT WITH ONE FINGER
HOLDS ONE HANDFUL
1/16" PERFORATIONS
MOTORIZED



Lazo—does it again! The pioneer AGAIN is FIRST—with the NEWEST! The Lazo Minim Lucite Plating Barrel is the baby brother of the 6x12 inch Lazo Barrel. No basket! Particularly adaptable for plating of electronic parts, jewelry, etc. Single hook, similar to plating rack, makes it more practical than larger units. Standard 1/16" perforations give same high quality and speed of plating as 3/16" perforations . . . Equipped with single-phase, gearhead motor of 110-v, 60 cycles. Overall dimensions: 9x7x17 inches high . . . List price $78 f.o.b. Chicago. Ship wt. 11 lbs. . . . Order direct. One year guarantee!

HARDWOOD LINE MFG. CO.
For 18 Years America's Headquarters for Super-Quality Plating Barrels
2022 North California Avenue
CHICAGO 47

Nice Product, Nice Package

Folks often wonder why we spend an extra ¼¢ a pound out of our own pockets for a lithographed drum. Fact is we're proud of the quality of BFC Chromic Acid and figure it deserves a bright, colorful container.

Every batch gets checked against a tough quality spec. Off-grade acid goes on the dump. Only top-quality material goes into those shiny BFC drums. Send us a modest order and see for yourself.

BETTER FINISHES & COATINGS, INC.

268 Doremus Ave., Newark 5, N. J.

122 East 7th St., Los Angeles 14, Calif.

PAINTS · PLASTICS · CHEMICALS BFC

Harry Anderson

in the evenings and will graduate in January 1956.

Harry Anderson comes to the company as a sales representative for Detroit and surrounding territories, including Toledo, Ohio.

Prior to his appointment, he was with Parker-Wolverine and Industrial Stamping and Mfg. Co. of Detroit, as a buyer. His experience covers eight years in the metal finishing field with these two firms.

He attended Michigan State College and Lawrence Institute of Technology studying Industrial Engineering.

Graver Announces New Sales Representative

H. R. Fosnot, sales manager of *Graver Water Conditioning Co.*, New York has announced the appointment of the *Allen-Shuff Corp.* of Memphis and Nashville as sales representatives. Their territory will include all of eastern Arkansas, northern Mississippi and western Tennessee from the Tennessee to Mississippi Rivers.

Allen-Shuff will handle the complete line of industrial, municipal and industrial waste treatment equipment.

W. Harwell Allen, vice-president and general manager, *Charles F. Almand*, Memphis branch manager, and *Stephen J. Wilkie*, sales engineer bring to Graver a background of experience in the power plant and water conditioning field that will be of value both to the organization and to its customers.

Allen-Shuff is located at 1121 Church St., Nashville 3, Tenn.

Townsend Appointed Director of Handy & Harman

M. W. Townsend, assistant to the

cities, Baker is well qualified to present the buffing compounds to all buffing and polishing plants. For quick deliveries stocks will be maintained in Baker's Cleveland warehouse.

Mc Aleer Mfg. Corp. Appoints Representatives

Tom Tomezak has recently been appointed a sales representative for *McAleer Manufacturing Corp.*, Detroit. Prior to being assigned to the sales department he was employed in the plant making the various polishing and buffing compounds.

He spent three years in the U. S. Marine Corps before coming to McAleer. He is studying business administration at the University of Detroit

Tom Tomezak

M. W. Townsend

president, was appointed a director of *Handy & Harman* by the board of directors at their meeting April 28th in New York.

Mr. Townsend joined the processors of silver, gold, and platinum, in 1946; he served in the sales department and was sales manager prior to his present post.

Shock no Longer Executive Secretary of N.A.M.F.

Raymond M. Shock tendered his resignation as executive secretary of the *Natinal Association of Metal Finishers* on Saturday, April 16, 1955, which was accepted by the board of directors to take effect on May 1st.

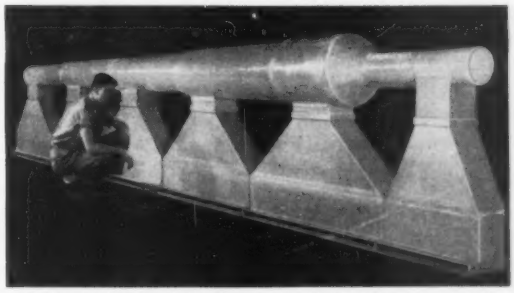
Perma-Line Installs New Vulcanizer

The installation of a new, modern autoclave vulcanizing service, for the application of hard and soft vulcanized sheet rubber and synthetic linings in plating and industrial acid handling tanks is announced by the *Perma-Line Rubber Products Corp.* This will be an added service to its existing facilities, which has long specialized in building and lining tanks with Koroseal, Amer-plate and other types of plastic linings, and the manufacture of corrosion resistant products.

A feature will be the application of various combinations of hard, medium and soft rubber sheeting to produce laminated vulcanized tank linings according to customer needs and specifications.

This new service will also be available for the application of hard and soft rubber and synthetic coatings and linings on pipes, fittings and other industrial acid handling products.

ENGINEERED STANDARD EQUIPMENT FOR YOUR COMPLETE VENTILATION REQUIREMENTS



Rigidon Solid Plastic Hood and Duct Section Ready to Install

EXHAUST HOODS • DUCTS • STACKS • COVERS

Fabricated of solid plastic or lined steel. Standard designs available.

Rubber Covered Blower

EXHAUST FANS — Solid Plastic Fans or Lined or Coated Blowers Handle the Toughest Corrosive Atmospheres.

FUME WASHERS — New Improved Design. Available in Standard Model Sizes.

AIR SAVER SYSTEMS — Pre-Engineered, Push-Pull Exhaust — Minimizes makeup air requirements.

•

COMPLETE ENGINEERING SERVICE AVAILABLE TO ASSURE PROPER ECONOMIC DESIGN TO ALL COMPONENTS OF YOUR VENTILATING SYSTEM REQUIREMENTS.

See these new products displayed at Booth 373 at the A. E. S. Show or write for further information.

CHEMICAL-PROOF LININGS · TANKS HEATERS PLASTICS

HEIL PROCESS EQUIPMENT CORPORATION

12901 Elmwood Avenue • Cleveland 11, Ohio

Consider Solid Plastics for: Complete Ventilating Systems
Structural Parts • Tank Covers • Splash Shields

Company Changes Name

The *Russell H. Burns Compound Co.* is successor to the E. Reed Burns Mfg. Co., makers of buffing and polishing compounds since 1888 and previously located in Brooklyn.

The new firm is situated at 810 Lincoln Blvd., Middlesex, N. J., phone ELliott 6-1838.

Steinwender Permutit Vice-President

Sheller L. Steinwender has been appointed vice-president of *The Permutit Company*, New York 36, N. Y., according to an announcement by *Henry W. Foulds*, president of the water conditioning firm.

Sheller L. Steinwender

Before joining the company, Mr. Steinwender, a chemical engineer, was vice-president of the Scaife company in Pittsburgh, Pa. Prior to that, he was with the A. O. Smith Corp. and the American Cyanamid Co.

Nation-Wide Sales Force Announced by Engelberg Huller Company

A nation-wide sales force for the *Engelberg Huller Co.'s* abrasive-belt machinery division has just been completed, according to *John T. Schenck*, president of the Syracuse, N. Y. firm. Nine sales engineers, each covering a regional territory, will be responsible for division sales and service assignments. Engelberg Huller acquired the abrasive-belt machine division of the *Porter Cable Machine Co.* in 1953.

Mr. Schenck has named the following men to territorial assignments: *Cecil E. Gordon*, southwestern territory; *Charles Vergan*, central territory; *Glenn D. Swander*, southeastern territory; *J. D. Kraeger*, west coast territory; *Earl Whitt*, mid-Atlantic territory; *Howard Miller*, east central territory; and *Charles Murphy*, northeastern territory. *David Turner* will act as an agent in the company's west central territory and *Harvey Ramsay* will act in the same capacity in the Canadian territory.

Federated Metals Appointed Exclusive Agent for Incar Plating Chemicals

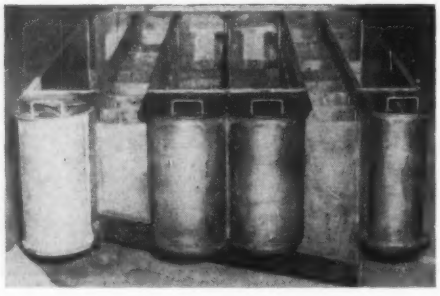
Federated Metals Division, American Smelting and Refining Co., has been appointed exclusive agents for a line of plating chemicals manufactured by *Incar, Inc.*, Cleveland, Ohio, it was announced today. Incar will produce and service the chemicals, while Federated's plating and electrochemicals department will arrange for distribution through leading plating supply houses. The new line of chemicals will supplement the company's present plating anode business which includes copper, zinc, cadmium, tin, lead, including the well-known Conducta-Core, brass, silver, flattop, and other non-ferrous anodes.

Wagner Bros. Equip. Co. Names New General Manager

Steve Jerome has been appointed general manager of *Wagner Bros. Equip. Co.*, 7800 Dix Rd., Detroit 9, Mich., announces *J. R. Wagner*, president.

Steve Jerome

Mr. Jerome has had several decades of widely diversified experience on the engineering, production and management levels of plant operation. Recently he was in charge of setting-up a new plant in Canada for one of the largest American manufacturers of welding equipment.



Storage units by STORTS - - precision welded

THE dimensional accuracy and perfect alignment of Stortswelded fabrications means more than neat appearance. It assures fine performance, smooth functioning of moving parts, better handling of materials, complete satisfaction. Sound welding adds long life utility to operating efficiency. Make Storts *your* source.

STORTS WELDING COMPANY INCORPORATED

38 Stone Street
MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

BEAM-KNODEL CO.

Metropolitan Distributors

HANSON-VAN WINKLE-MUNNING CO.

Complete Service for Metal Finishing

Products Listed Below Available in New York Stock With Reasonable Exceptions

GENERATORS

Anodes, All Kinds	Tallow	Nickel Salts
Brushes	Rouge	Copper Salts
Buffs	Emery Paste	Cyanide
Chemicals	Cleaners	Tanks, All Kinds
Tripoli Comp.	Emery	Plating Barrels
Acme White Finish	Glue	Polishing Wheels
		Polishing Lathes

195 LAFAYETTE ST., COR. BROOME
Phone CAnal 6-3956-7 NEW YORK 12, N. Y.

FILTERS

MAIZO Drying Materials

LEA Buffing & Polishing PRODUCTS

Revere Appointment and Expansion

E. Ross Houston, formerly on the sales staff of the Dallas division of *Revere Copper and Brass Inc.*, in Chicago, has been appointed district manager of the company's newly enlarged Minneapolis sales district.

At the same time it was also disclosed that the company was moving its Minneapolis office to larger quarters at 5620 West Broadway in Minneapolis. The Minneapolis offices had been at 6111 Excelsior Boulevard.

The sales district now includes South Dakota, with the exception of a tier of counties in the western part of the state, as well as the states of Minnesota and North Dakota, and some counties in western Wisconsin.

North Shore Nameplate Moves Again to Larger Quarters

North Shore Nameplate, Inc., manufacturers of Speedy Cals — anodized, etched foil nameplates — has moved for the third time, to newer and larger quarters, 13,500 square feet to be exact, located at 214-27 Northern Blvd., Bayside, N. Y. The phone number remains Bayside 4-4000. Plant space is up six times and manufacturing equipment is doubled.

Old Timer Retires

Charles L. Kunzer, who started his electroplating apprenticeship in 1899, has retired after 49 years with the New York Central. He had been with the railroad since 1905, repairing and replating silverware used in dining cars.

Mr. & Mrs. Charles L. Kunzer

Present plans include some travel for Mr. and Mrs. Kunzer.

C. L. Schroeder Purchases Omaha Retinning

Omaha Retinning Corp., 1202-08 Pacific St., Omaha, Neb. has been purchased by *C. L. Schroeder*, president and treasurer. Other officers are *Mrs. G. M. Schroeder*, vice-president; *M. C. Arnold*, secretary; *Mrs. Rose Jackson*, ass't. secretary.

Mr. Schroeder, until recently, was national sales manager of Omar, Inc., large baking and food firm, and previously vice-president and general sales manager of McLaughlin Gormley King Co., Minneapolis for many years. Omaha Retinning Corp. retins and rebuilds food processing equipment for the food industry, milk and cream cans for the dairies, meat-packing industry, etc. The company will do a national business through manufacturer's representatives. The firm has been established since 1925.

Our Los Angeles Office Moved

The offices of Fred A. Herr, Pacific Coast Manager of *Metal Finishing* and *Organic Finishing*, have been moved to Room 518, 219 West 7th Street, Los Angeles 14, California. The telephone number remains the same — MAdison 6-5421.

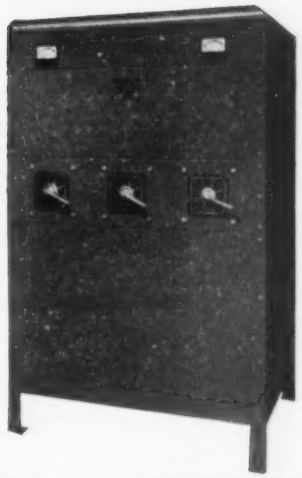
Larger facilities are required because of the increasing volume of business in the growing Los Angeles area.

SEE

THER Electro-Plating and Anodizing RECTIFIERS

BOOTH 129

INDUSTRIAL FINISHING EXPOSITION
Cleveland Public Auditorium
JUNE 20-23



Ther 12 v., 5000 amp. Self-Contained Rectifier.

Featuring conservatively rated premium quality selenium and the new *Germanium* stacks.

Ther plating Rectifiers are job rated to give you the most in D.C. power for your operation.

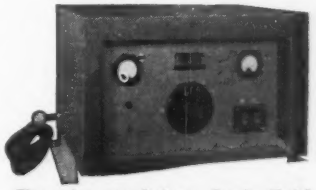
Arc-eliminating voltage controls protect and lengthen service life of components and equipment.

Copper conductors and bus bars are used throughout to provide maximum conductance and resistance to corrosion.

Fully enclosed ball-bearing fan motors are incorporated in all units.

Vacuum cooling, proven in practice as the most effective means of producing uniform air distribution.

Models are available as either 5% or 18% ripple, depending on which is most suited to your operation.



Ther also manufactures Bench Model Rectifiers. All models are drip-proof in construction, convection cooled and complete with stepless variable voltage control. Sizes range from 25 to 250 amps. 6 v., 150 amp. unit shown.

RESULT: HIGH EFFICIENCY, LONG LIFE AND TROUBLE-FREE OPERATION.

Ther Rectifiers for plating or anodizing are available in a complete line in sizes ranging from 6 to 50 v. at from 25 to 30,000 amps, with self-contained or remote controls, either manual or automatic.

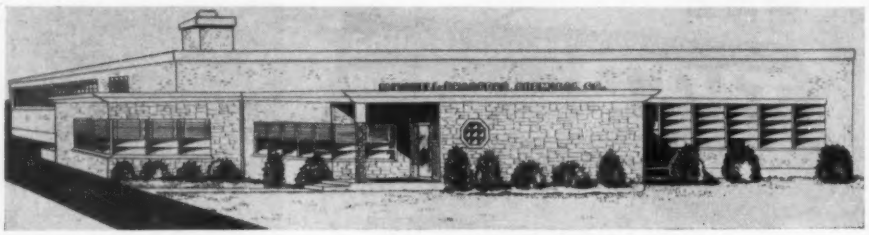
Contact Ther for your specific needs in plating power. Request new Bulletin 5500 containing important data on rectifier arrangements and valuable installation hints.

THER ELECTRIC & MACHINE WORKS

ESTABLISHED 1915

19 South Jefferson Street • Chicago 6, Illinois

The Mitchell-Bradford Chemical Co. in New Quarters



A. J. Mitchell, president of *The Mitchell-Bradford Chem. Co.*, manufacturers of Black Magic blackening processes, metal cleaners, rust preventives, plating specialties, and a complete line of heat treating salts, announces the completion of their new modern plant to accommodate increased production, larger offices and research facilities, located at Wampus Lane, Milford, Conn.

The manufacturing area was planned in a straight line flow system, allowing steady uninterrupted production. A larger section is set up for the chemical research laboratory for product control, new product development and customer problems. The latest in architectural design and interior decorating has been incorporated in the executive and general offices. The plant is situated on approximately three acres of land to provide for further expansion.

Land Will Direct Pennsalt's Industrial Chemicals Div.

Hugh C. Land, 39-year-old Coloradian, will succeed *William P. Drake* as head of the *Pennsylvania Salt Mfg. Co.'s* Industrial Chemicals Division, the latter announced recently. Mr. Drake recently was named executive vice-president when president *George B. Beitzel* announced plans to retire later this year upon completion of 25 years' service with the company.

As general manager of this major operating division, Mr. Land will direct both production and sales activities. These include four plants and ten sales offices which produce and distribute a diversified line of heavy chemicals for use in virtually every basic industry.

Mr. Land reecived his degree of bachelor of science in Chemical Engineering at the University of Denver in 1938. His first association was with the A. S. Horner Construction Co. During the war he served for four years with the U. S. Chemical Warfare Service as maintenance chief of the Rocky Mountain Arsenal.

Joining Pennsalt in 1946 at the company's Wyandotte, Mich. works, Mr. Land served successively as field engineer, maintenance and construction engineer, and assistant superintendent. He was transferred to the Philadelphia executive offices in 1949 to become assistant to the production manager ,whom he succeeded in 1950. In 1954 he was named manager of manufacturing of the Industrial Chemicals Division.

Mr. Land belongs to numerous professional and industrial organizations and is active in the civic affairs of the Drexel Hill community in which he and his family reside.

New Engineering Representatives for Wiegand

Edwin L. Wiegand Co., Pittsburgh, Pa., has announced the appointment of *Harold Miles and Associates* as sales engineering representatives in Tennessee and in Alabama north of the Tennessee River.

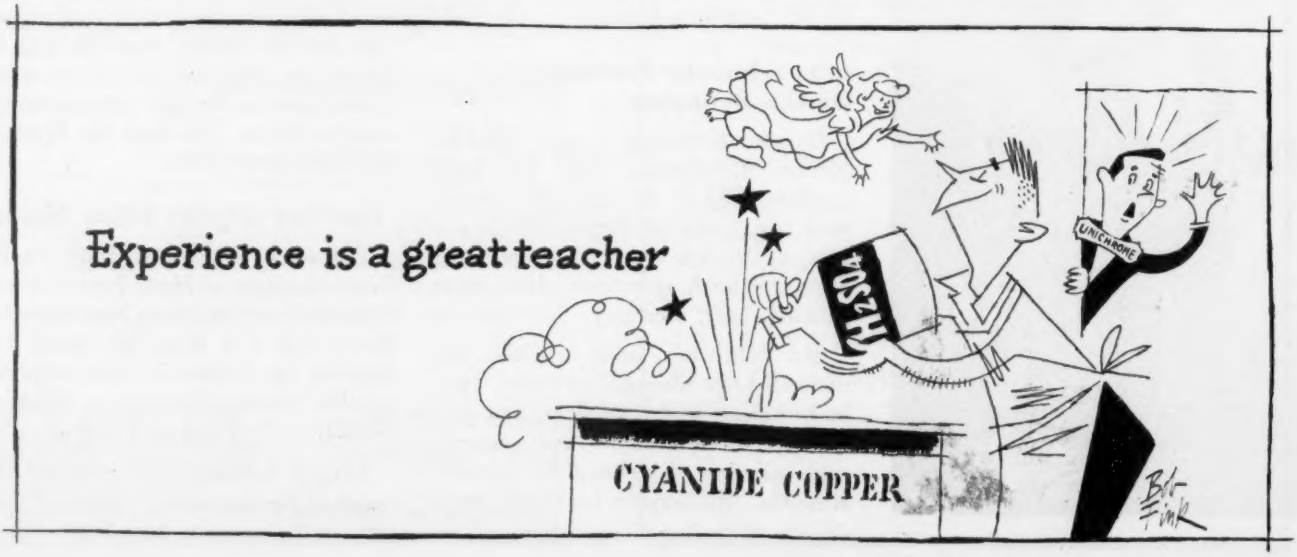
Harold Miles, an electrical engineering graduate of Ohio State University, has grown up with the organization and has an impressive electrical heating background that started at the plant in Pittsburgh in 1937. He was appointed sales manager of industrial heating equipment in 1943, held that post until 1949 when he joined C. B. Rogers & Associates of Atlanta, company representatives in the Southeast.

The new organization will handle the complete Chromalox line of industrial equipment and electric heater units.

Houghton Appoints John Bermingham

The appointment of *John Bermingham*, formerly sales representative, as the Western sales manager for *E. F. Houghton & Co.*, has been announced by *D. J. Richards*, vice-president sales.

Mr. Bermingham succeeds the late *W. A. Fletcher*, who died on April 5th and who had been the Western sales manager since 1941. Mr. Bermingham is at present chairman of the San Francisco Section of the American Foundrymen's Society and was formerly Chairman of the Bay Section of



the American Society for Metals. He is well known in metal working circles.

Mr. Bermingham is married and resides in Lafayette, Calif., an Oakland suburb. His headquarters will continue to be located at the company's West Coast plant located at 1500 Davidson Ave., San Francisco 24, Cal.

Harp Rejoins American Machine and Metals

American Machine and Metals, Inc. announces that *A. M. Harp* is returning to the company as general sales manager of the *DeBothezat Fans Division,* succeeding *C. J. Gaspar.* Mr. Harp, who has recently been vice president and general manager of Connecticut Telephone and Electric Co., previously served for many years as DeBothezat sales manager.

C. B. Sanborn Joins Electroplating Section of Inco's Development and Research Division in New York

Charles B. Sanborn has joined the Electroplating Section of the Development and Research Division of *The International Nickel Co., Inc.,* in New York, according to an announcement by *O. B. J. Fraser,* assistant manager of the division. The Electroplating Section is principally concerned with the technical aspects of the applications and uses of nickel coatings.

Mr. Sanborn was formerly associated with Graham Crowley & Associates, Inc., Chicago, Sherwin-Williams Co., Cleveland, and American Steel & Wire Company, Cleveland, where he was senior research chemist at the company's research laboratories.

Charles B. Sanborn

Mr. Sanborn graduated from Fenn College, Cleveland, in 1936 with the degree of Bachelor of Science in Chemical Engineering. He is a member of the *American Chemical Society,* the *American Electroplaters' Society* and *The Electrochemical Society,* of which he is a past chairman of the Cleveland Section.

Giesker Appointed Superintendent of Autoyre

William Giesker has been appointed superintendent of *The Autoyre Co.,* the world's largest manufacturer of bathroom, kitchen, and closet accessories. He has been associated with the company for eight years. He became employed as research engineer and more recently has been the company's chief chemist. Prior to that time, he was with The Allegheny Ludlum Steel Co. and United Chromium, Inc., in research fields.

Mr. Giesker is a graduate of

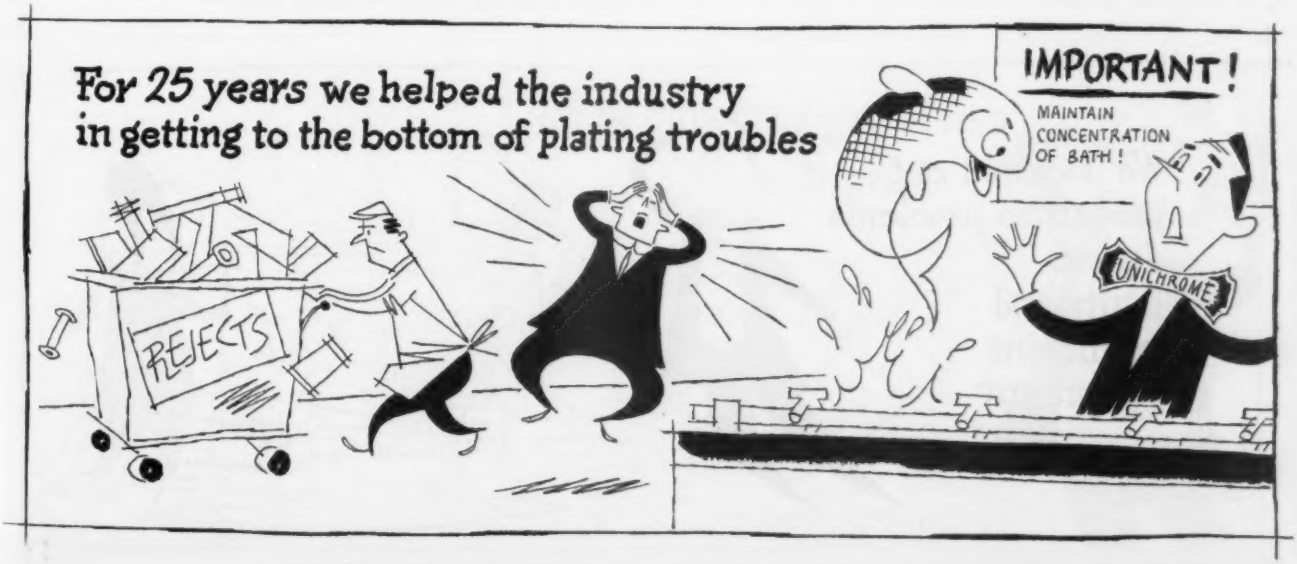
William Giesker

Rensselaer Polytechnic Institute and holds the Bachelor of Chemical Engineering degree. He now resides in Watertown, Conn. with his wife and one son.

The Robert S. Leather Mechanical Finishing Award

Robert S. Leather, founder and former president of *The Lea Manufacturing Co.* recognized, many years ago, the necessity for changing the buffing and polishing industry from an "art" to a "scientific method of surface finishing." To encourage qualified individuals who might be instrumental in bringing about this transition, the company in 1950 granted an annual award called "The Lea Award," as an incentive for the best contribution to the knowledge and art of mechanical finishing.

After Mr. Leather's death in January 1954, in order to commemorate


For 25 years we helped the industry in getting to the bottom of plating troubles
IMPORTANT!
MAINTAIN CONCENTRATION OF BATH!
REJECTS
UNICHROME

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his many contributions to the finishing industry, the name of the award was changed to "The Robert S. Leather Award."

Administration of this award is made by an Awards Committee of the *American Electroplaters' Society*. It is awarded at the Annual National Convention.

Barger and Kehm Join Hooker Electrochemical

Bion D. Barger, Jr., and *John Kehm*, chemical engineers, have joined the process study group of *Hooker Electrochemical Co.*, Niagara Falls, N. Y., it was announced by *F. Leonard Bryant*, works manager.

Mr. Barger, whose home town is Seattle, Wash., was graduated from the University of Illinois in 1949 with the degree of bachelor of science in chemical engineering. Two years later he was awarded the master's degree from the University of Washington. He was then employed by M. W. Kellogg Co., in Jersey City and New York, first as a research engineer and later as a process design engineer. In February, 1954, he joined Stauffer Chemical Co. at Chauncey, N. Y., working as a development engineer until coming to Hooker. Mr. Barger is a member of the American Institute of Chemical Engineers and the American Chemical Society.

Mr. Kehm was born in Lincoln, Nebraska. He was graduated from the University of Nebraska in 1952 with the degree of bachelor of science in chemistry and in chemical engineering. From 1952 through 1954 he was a production engineer with the Aluminum Co. of America at East St. Louis, Ill.

International Nickel's New Plating Laboratory

A new plating laboratory, the main feature of which is the world's only fully automatic pilot plating plant, was unveiled at the Bayonne Research Laboratory of *The International Nickel Company, Inc.* on April 14. This pilot plant for the first time permits the testing of new plating processes and metallic coatings under conditions virtually similar to those existing in actual industrial plating plants. The new plating laboratory climaxes years of intense research by the company on procedures for coating metals and the study of new types of coatings. The laboratory, which is equipped to undertake research in any phase of the plating field, is the latest addition to the Bayonne research activities.

The fully automatic plating line is capable of producing coated metal test panels in large numbers with an extremely high degree of control to assure uniformity. Together with data obtained in their production, these panels provide the plater with an accurate forecast of the feasibility of a new plating method or new type coating. The automatic equipment has provision for 13 different stations of plating and can be used in either single or double line operation, handling work up to three feet in cross-section. It can be operated entirely from a central panel board where time, current and voltage for each stage of a cycle can be observed and controlled. Power for cleaning and plating operations is supplied by a bank of six rectifiers, each rated at 1000 amperes at 12 volts and 2000 amperes at 6 volts.

"Bench-scale" operations at the plating laboratory.

Full view of automatic plating machine. The machine can be operated entirely from the central board where time, current and voltage for each stage can be controlled.

The automatic transferring and conveying system permits work to remain stationary at any given position for as long as desired, varying from as little as five seconds to as much as several hours, or even days.

One particularly interesting project now in progress at the laboratory is the research being done in cooperation with container manufacturers and their suppliers of can stock. This involves extensive investigation into the merits of thin nickel plating for can coatings.

Diamond Alkali Promotes Dr. Lightfoot

Promotion of *Dr. William J. Lightfoot* to the position of chief staff engineer in *Diamond Alkali Co.'s* central engineering department has been announced by *C. C. Brumbaugh*, director of engineering.

Dr. Lightfoot joined the organization in July, 1952, as a development engineer, and since then has been engaged in atomic energy and soda ash research projects. At his new post, he will be responsible for economic studies, process flow sheets, and staff work.

A native Clevelander, Dr. Lightfoot was educated in Cleveland schools and earned his B.S. and M.A. degrees in chemical engineering from Case Institute of Technology. He received his Ph. D. degree in chemical engineering there in 1943.

Formerly assistant professor at Fenn College, Dr. Lightfoot also has been a process engineer with the Great Lakes Carbon Co. and the Glenn L. Martin Co. He later joined the engineering staff of the H. K. Ferguson Co. as a consultant.

A member of the American Chemical Society and the American Institute of Chemical Engineers, he also has been elected to Sigma Xi and Tau Beta Pi, honorary scientific fraternities.

Schuler Joins Beckman Instruments, Inc.

H. S. (Bud) Schuler has joined the Beckman Division of *Beckman Instruments, Inc.*, Fullerton, Calif., as advertising and sales promotion manager.

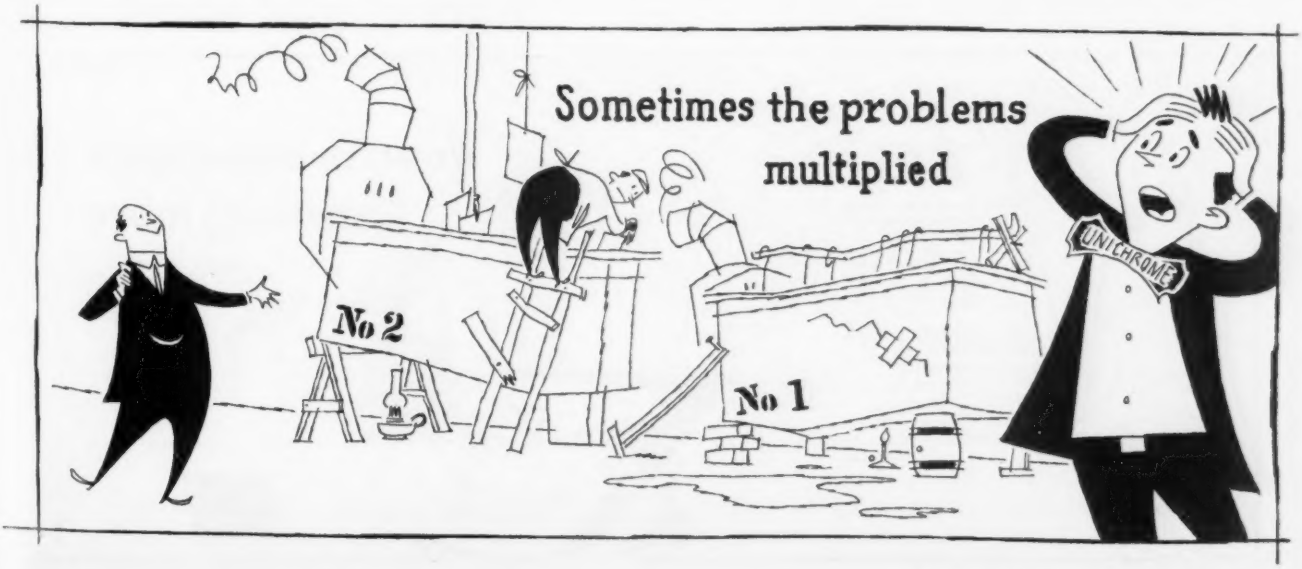
Prior to his new appointment, Schuler spent 18 years with the Westinghouse Electric Corp. in various advertising executive capacities. His post for the past two years was assistant general advertising manager, working out of Westinghouse's Pittsburgh, Pa. headquarters.

Schuler also served as account executive with the Pittsburgh advertising agency of Ketchum, Macleod and Grove.

Reinfeld Elected President of Pyrosil

Election of *Vincent P. Reinfeld* as president of *Pyrosil, Inc.*, Cuyahoga Falls, O., manufacturers of industrial electroplating, infra-red oven and acid pickling accessories was announced recently.

Reinfeld has been associated with



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Vincent P. Reinfeld

John M. Maitland

Executive Services of Cleveland, management consultants on plant scheduling and inventory control and will continue as a technical consultant for the firm.

Bristol Names J. M. Maitland Detroit District Manager

John M. Maitland has been named manager of the Detroit District office of *The Bristol Company*, Waterbury, Conn., according to a recent statement by *H. E. Beane*, vice-president—sales.

Mr. Maitland attended the University of Michigan, and the Michigan College of Mining and Agriculture, receiving his B.S. degree in Chemical Engineering from the latter school.

After a brief period with the North Range Mining Co., he went to the Grasselli Chemicals Division of E. I. duPont, where he remained until 1944. In that year, he joined the Bristol sales staff at the company's Cleveland office, moving to Schenectady in 1946. In 1953, he was transferred to the New York office, where he has been located until his recent promotion.

Mr. Maitland has been active in instrument organizations, as president of the New York Section of the Instrument Society of America, and past president of the Eastern New York Section ISA. He is also a past vice-president of the New York State Junior Chamber of Commerce.

Honeywell Names Three to New Midwest Region Posts

Three field personnel changes in *Minneapolis-Honeywell Regulator Co.'s* Midwestern region have been announced by *Gavin S. Younkin*, the company's general sales manager.

Arnold Challman, for the past four years manager of the company's branch office in Peoria, has been named to the newly created position of administrative assistant to Manager *T. S. Carley* in the company's regional sales and service office in Chicago.

R. C. Ferguson, formerly manager of the district sales office in Davenport, will manage the Peoria branch office while *R. R. Scott*, former regional sales manager for the company's valve division in Chicago, is the new manager of the Davenport office.

The Midwestern region handles sales, installation and service of automatic controls in Illinois and Indiana and parts of Michigan, Wisconsin, Iowa, Missouri, Kentucky, Tennessee, Arkansas and Mississippi. It includes 15 branch and regional offices.

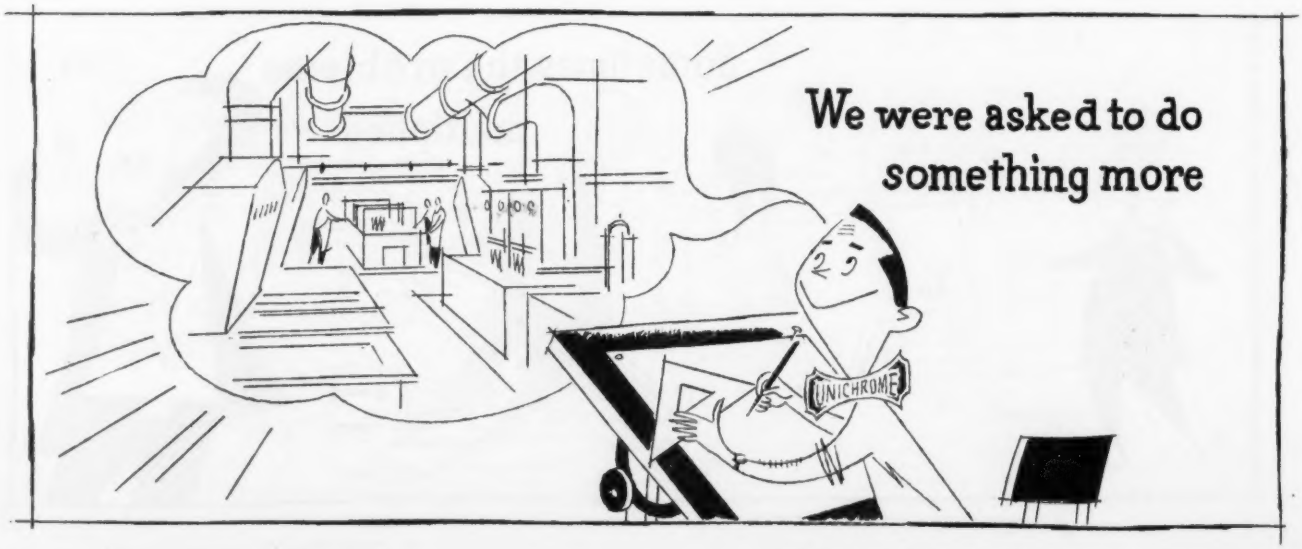
Challman is a native of Seattle, Ferguson is from Algona, Ia., and Scott is a native of Oak Park, Ill. All have been with the company since 1946.

Marlane Company Appointed East Coast Distributor For Dawson-Riedel Barrel

The *Marlane Development Co., Inc.* of 153 E. 26th St., New York 10, N. Y. announces that it has just been appointed East Coast distributor for the Dawson-Riedel chromium plating barrel, a product of the *Dawson Corp.* of Pelham, N. Y. Marlane will be responsible for all sales and technical servicing in this area.

Michigan State Alumni to Hold Reunion at A.E.S. Convention

Michigan State College alumni will meet for a special breakfast at the 42nd Annual Convention of the *American Electroplaters' Society* in Cleveland, Ohio, Wednesday, June 22. The first such MSC reunion was held at the 1954 convention in New York City



and was so successful that it is being repeated this year and will probably become an annual affair. Michigan State College alumni who plan to attend the convention should notify *Professor C. Fred Gurnham* of the Department of Chemical Engineering at the College as soon as possible in order to reserve a place.

Thermo Panel Division of Dean Products, Inc. Appoints Sales Representatives

The *Thermo Panel Div.* of *Dean Products, Inc.*, 1042 Dean St., Brooklyn, N. Y., have announced the appointments of *W. M. Wilson Co.*, 1316 Superior Ave., Cleveland, Ohio, covering the northern part of Ohio, and *A. A. Betts Co.*, 3008 Harrison Ave., Cincinnatti, Ohio, covering the southeastern part of Ohio, the eastern part of Kentucky, and the center portion of Indiana.

Graver Appoints New Sales Engineer

H. R. Fosnot, sales manager, *Graver Water Conditioning Co.*, New York, N. Y., has announced the appointment of *J. D. Crell* as sales engineer for the New York City sales district.

Mr. Crell will work out of the New York Office at 216 West 14th Street. He has been with the company for several years and is completely familiar with all phases of municipal and industrial waste treatment.

Chemical Firm Merges Operations

The integration of the several Kelite corporations operating in the U.S.A. was completed April 1, 1955 when the stockholders of *Kelite Products, Inc.* of Illinois accepted a plan for exchange of shares. The combined organization is incorporated in California as *Kelite Corporation*, with *L. C. Sorensen*, founder of Kelite as president, and *W. G. Nuelsen*, former president of the Illinois corporation as senior vice-president. *William Sorensen* is executive vice-president with headquarters in New York. There will be no change in personnel in the 98 U. S. offices maintained by the chemical and equipment firm. The Canadian and Mexican affiliates will continue to operate independently. In announcing the merger, Mr. Sorensen expressed confidence that the new corporation with its three integrated plants in Los Angeles, Chicago, and Berkeley Heights, N. J., would be able to handle efficiently the rapidly expanding volume resulting from the current high level of business activity.

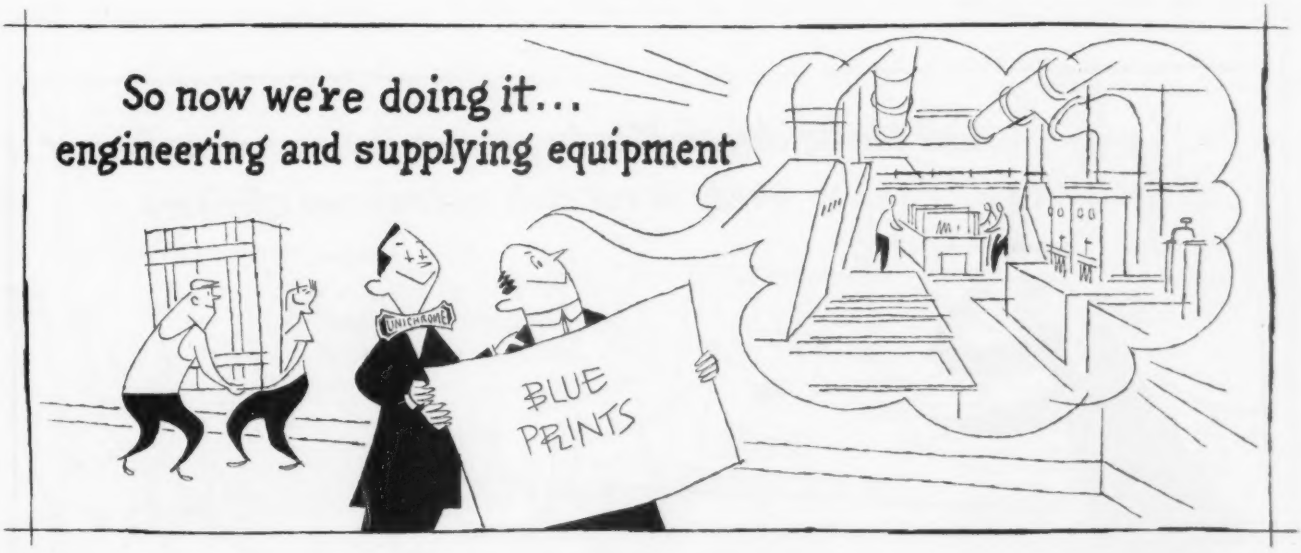
W. G. Nuelsen

William Sorensen

New Company Formed

The *Finishing Service Co.*, 4800 Washington Blvd., Chicago, Ill., has been organized to service both users and suppliers of finishings in several long felt needs in the whole broad field of finishings.

They will provide: first; consultation in all requirements pertaining to plating, organic or chemical coatings — setting up specifications, standards, and inspection procedures where necessary; second: laboratory testing, development, and research on finishings or related problems; third; placement of work with concerns qualified to



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Henry D. Levun

handle the work from the standpoints of both quality and price.

Consultation (except for major development work) will for the most part be free. Compensation will be derived principally from the third phase of their program; namely, placement of the user's needs with suppliers on a commission basis. In this placement activity they will serve as a "clearing house" for finishing facilities, gearing the job to the most efficient supplier, with a net saving to all concerned.

The organizer of the company, *Henry D. Levun*, was formerly quality control director of Santay Plastics Corp. and, during the war, was chemical engineer in the Finishing and Adhesives Laboratory of the Signal Corps, pioneering in the standardization of finishes for military equipment.

Frank Romanoff Appointed Tech Director of Apollo's Chicago and Bethlehem Plant Operations

Frank Romanoff, one of the foremost electrochemists in the country, has been named technical director in Charge of research and production processing operations at both the Chicago and Bethlehem plants of *Apollo Metal Works*. This announcement was made from the Chicago headquarters of the company.

During World War II, Mr. Romanoff participated in the vital Manhattan Project, making definite contributions to the first atomic energy program. He has been associated with the company some 15 years.

PATENTS

(*Continued from page* 117)

Method and Apparatus for Separating Waste Particles from Media Used in Sandblasting

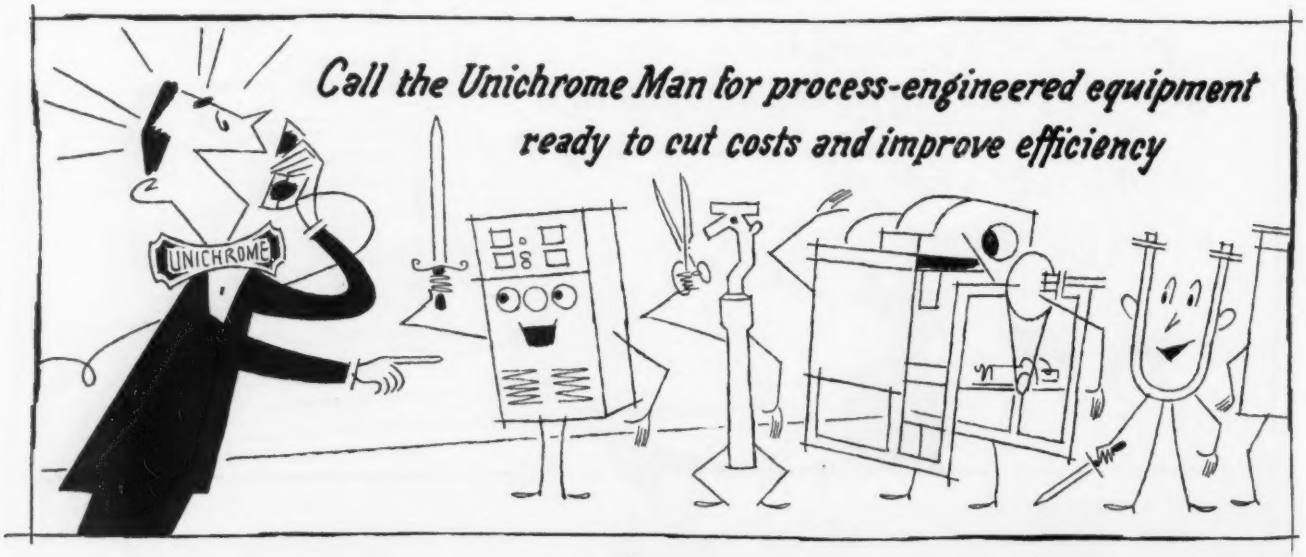
U. S. Patent 2,696,910. *Dec.* 14, 1954. *E. R. Ljungdell and K. G. E. Krantz, assignors to AB Svenska Flaktfabriken.*

In the method of separating dust and other waste particles from sand and like media used in sand blasting, the steps which comprise introducing a stream of waste sand blasting medium into a chamber located between a lower zone maintained at a predetermined pressure above atmospheric and an upper zone maintained at suction pressure, causing a current of air under predetermined positive pressure to pass through said chamber from said lower zone to said upper zone at a predetermined velocity in a direction to engage and pass through said stream of waste blast medium to entrain and carry off to the upper zone the waste particles in the medium having a size and weight less than the sand particles of the medium which are caused to pass into the lower zone, filtering from the current of air in the suction zone the entrained waste particles, and regulating the suction pressure at the downstream side of the filter in correspondence to the degree of blockage of the filter to maintain substantially constant the velocity of the current of air passing through said chamber.

Combination Barrel and Rack Electroplating Apparatus

U. S. Patent 2,697,689. *Dec.* 21, 1954. *S. E. Barr and C. I. Knecht, said Barr assignor to Western Electric Co.*

Electroplating apparatus comprising an open top tank, a rotatable drive shaft extending longitudinally of the top and journalled to one side of said tank, a motor for rotating said drive shaft, a pair of spaced cams secured to said drive shaft, a removable frame resting on the top of said tank, means for securing said frame to said tank against lateral movement, a pair of aligned bearings on said frame in alignment with each of said cams a cathode rod mounted for longitudinal movement in each said pair of bearings and extending perpendicular to said shaft, spring means biasing each of said cathode rods into engagement with one of said cams, whereby the rotation of said drive shaft and said cams secured thereto causes reciprocation of said cathode rods against the biasing of said springs, an anode rod fixed to said frame between said cathode rods and parallel thereto, and anode rods secured to said tank and extending parallel to and on opposite



sides of said cathode rods from said anode rod fixed to said frame.

Electroplating Rack

U. S. Patent 2,697,690. *Dec.* 21, 1954. *A. H. Beebe, Jr., assignor to Federal-Mogul Corp.*

An electroplating rack for concave surfaces of workpieces comprising a substantially imperforate but not necessarily fluid-tight casing having a longitudinal aperture extending through one wall thereof against which such workpieces are held with their concave surfaces facing said aperture, means providing a throat for said aperture adjacent the inner surface of said one wall substantially at the center of curvature of such surfaces, the remainder of the walls of said aperture being outwardly tapering to provide an opening in the outer surface of said one wall which is several times the dimension of said throat whereby the rate of plating through said aperture is substantially increased.

Process for Making Aluminum Coated Material

U. S. Patent 2,697,869. *Dec.* 28, 1954. *W. E. Kingston, I. N. Zavarine and C. E. Bussert, said Bussert assignor to Armco Steel Corp., and said Kingston and Zavarine assignors to Sylvania Electric Products, Inc.*

A process of producing a coated ferrous sheet gauge stock which comprises hot rolling ferrous metal to thicknesses substantially between .180 and .080 inch, cold rolling it to thicknesses substantially between .100 and .040 inch, coating the cold rolled stock with aluminum in thickness substantially between .002 and .0005 inch on any coated surface, cold rolling the stock to thicknesses between substantially .06 and .005 inch whereby to reduce the aluminum coating thereon to between substantially .0003 and .0001 inch on any coated surface and thereafter heat treating the coated stock wherein said heat treatment is an open anneal, the temperatures lying within the range substantially between 1450 and 1750 degrees F. for a time varying directly with thickness of base metal and inversely with temperature between substantially 7 minutes and 17 seconds.

Conversion Coating

U. S. Patent 2,698,266. *Dec.* 28, 1954. *J. H. Thirsk, assignor to American Chemical Paint Co.*

An aqueous metal treating bath consisting of water, chromic acid, and cerium nitrate, said chromic acid being present in an amount of from 0.04 to 12 grams per liter and the cerium nitrate being present in an amount of from 0.02 to 6 grams per liter.

Non-Tarnishing Cleaner

U. S. Patent 2,698,302. *Dec.* 28, 1954. *H. S. Sylvester, assignor to Colgate-Palmolive Co.*

A detergent composition consisting essentially of about 10 to 50% of a water-soluble anionic organic synthetic detergent selected from the class consisting of the water-soluble anionic organic detersive sulphates and sulphonates, and about 10 to 80% of water-soluble inorganic polyphosphate salts selected from the group consisting of tripolyphosphates, pyrophosphates, hexametaphosphates, tetraphosphates and mixtures thereof, and having incorporated therein about .05 to about 3% by weight of unsymmetrical mononuclear aryl thiourea.

A detergent composition normally tending in water solution to cause tarnishing of a copper base alloy consisting essentially of a water-soluble inorganic polyphosphate, and having incorporated therein a minor amount of a mononuclear aryl thiourea sufficient to inhibit said tarnishing.

Manufacturers' Literature

Fused Quartz Radiant Heaters

Cleveland Process Co. Dept. MF, 1967 East 57th St., Cleveland 3, O.

A four-page folder, Bulletin No. 100, describing the multiple uses and added efficiency of Clepco quartz radiant heaters has just been released. The folder illustrates the various shapes and sizes and their application to baking and drying jobs.

Specifications and prices on elements and complete assemblies of 24 stock models are listed in the folder. "On the job" photos and detailed line drawings give complete information for installing and operating these modern, efficient, fused quartz, radiant heaters.

Compressed Air Handbook

Sarco Company, Inc., Dept. MF, Empire State Bldg., New York 1, N. Y.

The first 6 pages of this bulletin

Yes, you've long known United Chromium for its leading role in plating developments and its technical aid to metal finishers. Now, United Chromium also supplies equipment for general plating... offering you the benefit of over 25 years close working experience with plating plant needs. When you work with United Chromium, you can be sure your equipment is designed for efficiency and economy.

Equipment for more profitable plating now offered by United Chromium includes:

TANKS • BLOWERS • HEATING COILS • RECTIFIERS
TEMPERATURE CONTROLLERS • ANODES • FILTERS
PUMPS • CATHODE AGITATORS • TANTALUM HEAT EXCHANGERS... AND MORE

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208 S. LaSalle St., Chicago 4, Ill.
Waterbury 20, Conn.
923 E. Third St., Los Angeles 13, Calif.
In Canada: United Chromium Limited, 15 Emily St., Toronto 1, Ont.

comprise a handbook with hook-up sketches to help users of compressed air to improve the capacity of their installations. It features cooling controls for compressor jackets, aftercoolers and intercoolers, and also describes drain traps, electric thermostats and pressure switches.

Monel for Pickling

The International Nickel Co., Inc., Dept. MF, 67 Wall St., New York 5, N. Y.

A new booklet, "Equipping the Pickle House," is offered as a practical guide to greater production at lower cost in a wide variety of pickling operations.

The 32-page, two-color booklet describes the use of specially designed Monel equipment in the processing of large and small fabricated parts, hollow ware, and forgings and castings, as well as the common mill forms of steel and tin plate. The text explains how the metal's corrosion resistance, strength, and ductility cut dead weight, permit greater payloads and assure longer service life.

More than 70 photographs illustrate practical applications of Monel in sling chains, yokes and special hooks, crates, racks, baskets, drums and other batch handling accessories and in hold-down rolls, lifting arms, pinch rolls, tank guides, and other parts exposed to corrosive conditions in continuous pickling lines.

A number of diagrams and a table of link specifications showing safe loads for chain are also included.

A final chapter illustrates and describes the machining, welding, shaping and forging, and lists Inco's technical bulletins which provide complete details on these operations.

Corrosion Proof Construction

Nukem Products Corp., Dept. MF, 111 Colgate Ave., Buffalo 20, N. Y.

The above company has issued two bulletins describing its acid brick flooring material and polyester resin corrosion proof cement. Also available is a new "Corrosion Engineers Manual," which shows the proper design of floors and tanks, using acid-proof brick and cement. The manual includes charts for selection and calculation of suitable lining materials, membranes, and shells and presents the basic facts on construction.

Plating Wall Chart

Finishing Publications, Inc., Dept. MF, Peoples Trust Bldg., Westwood, N. J.

An attractive plastic laminated reference wall chart 13″ x 16½″ is available without charge when requested on a business letterhead.

This chart shows conversion factors, the electrochemical equivalents of all the plated metals, and other essential data and the capacities of round and rectangular tanks.

Storing Coated Abrasives

Armour and Co., Coated Abrasives Div., Dept. MF, Alliance, O.

Topnotch performance of coated abrasives depends to a large degree on the conditions under which the product is stored prior to its use, according to a booklet, "How to Store Coated Abrasives."

The backing and adhesive of coated

For ALL Your
Metal Finishing Needs
Depend on DAVIES

The Southwest's Leading Supplier of Industrial Plating and Polishing

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"ROCKWELL" *Greetings*
TO DELEGATES AT THE
42nd Annual A. E. S. Convention

DOMESTIC "VIENNA" LIME
GAS FIRED DOLOMITE FOR PURITY

ABRASIVE FOR USE IN
Compositions and Steel Polishing

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abrasives are sensitive to climatic conditions and the rise and fall of a storage room's relative humidity causes strains to be set up between the abrasive and adhesive.

Further, when coated abrasives are stored under high humidity, they tend to fill and clog when put to use. If allowed to become too dry, the product will crack.

The eight-page illustrated booklet describes temperature and humidity limits for proper storage and suggests an ideal storage room location.

Vapor Phase Inhibitors

Angier Corp., Dept. MF, Framingham, Mass.

A new 19 page booklet discusses all phases of VPI corrosion prevention and its applications. As a new manual, it brings together for the first time information on the hows, whys and wherefores of VPI that will prove informative and useful to industry.

Titled "The Proven Method of Rust Prevention" the booklet gives a detailed explanation of vapor phase inhibitors and the chemical action that occurs to halt rusting on ferrous metals and aluminum. It cites specific cases of material and packaging cost-savings in industry through its usage and illustrates many applications of the product. Packaging requirements, protective life expectancy, and composition of the various wraps, are also given important coverage in the booklet.

Low-Foaming Surfactant

Rohm & Haas Co., Dept. MF, Washington Square, Philadelphia 5, Pa.

A new cleansing agent for use in industrial metal-cleaning, which combines excellent detergency with low-foaming is classified chemically as a non-ionic surfactant and is known as experimental detergent CF-10. It is being supplied in commercial quantities to formulators of compounds for cleaning metal.

The material is a very low foamer, even at high concentrations and under vigorous agitation. At the same time, it is an excellent detergent and may be used with highly alkaline builders to improve both detergency and rinsability, according to the above manufacturer.

Lacquers for Vacuum Metallizing

Schwartz Chem. Co., Inc., Dept. MF, 326 W. 70th St., New York, N. Y.

Two new lacquers have been developed to answer the need of polystyrene metallizers for tough, flexible and non-flaking top and bottom coats. For best results, the company recommends they be used as a team because the two lacquers are related for perfect chemical compatibility.

The new base coat lacquer is called BC-107. It prepares the surface of the plastic for permanent metallic deposition by providing a smooth, gloossy finish that fills and covers all cracks.

The bottom coat can be force-dried in one hour at 150°F. According to the manufacturer, it has excellent adhesion and will not craze or embrittle after the aluminum is deposited and the top coat lacquer has been applied.

The top coat is a clear, water-white lacquer called TC-101. It is specifically formulated for use as a tough protective coat after the metal has been deposited.

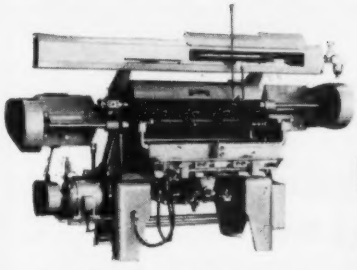
High gloss, "tenacious" adhesion, and permanent flexibility are features

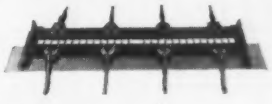
COMPLETE SURFACE FINISHING UNIT

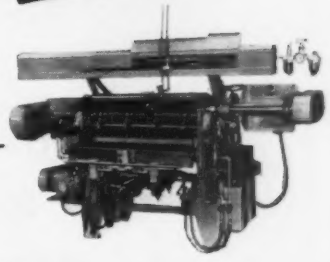
for SPOONS and FORKS!

CLAIR

Work racks, spindles and most moving parts are interchangeable on all Clair machines. Numerous optional features, such as Auto-cycling, Automatic Compound Applicators etc.





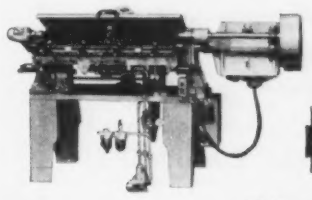


208 This "upside down" version of the staggered spindle assembly employed in the Model 204 serves as a companion machine capable of finishing Spoon and Fork handles and similarly curved items.

204 This Clair machine, like others illustrated, was custom made to fit a special need in the silverware industry for surface finishing Spoons and Forks. This machine uniquely allows simultaneous coverage of both inside and outside bowl surfaces, at any uniform predetermined buffing pressure.

ELECTRO-HYDRAULIC

All these machines have the "electro-hydraulic" feature for safe, economical operation. The patented quadrant mechanism is the unique principle that permits complete batch finishing of Spoon bowls and like objects. These three machines constitute a unit which permits complete surface finishing without "unloading" and "re-racking" normally encountered between operations.



205 To speed up the total operation this air-actuated Model was designed for supplemental coverage of deep bowl curvatures, both Spoon and Fork.

CLAIR MANUFACTURING CO., INC.
OLEAN, NEW YORK

Write now for further information on any surface finishing problem that confronts you!

OFFERING THE MOST VERSATILE LINE OF SURFACE FINISHING MACHINES

of the new top coat. The lacquer prevents the thin metallic silver or aluminum film from flaking off, protects it from abrasion, and gives it a lustrous finish.

The top coat can be force-dried at 150°F. in about 30 minutes.

Both coatings can be applied by dipping or spraying and are available in five-gallon cans and 55 gallon drums. The manufacturer points out that metallizers need not add any catalyst or thinner because both coatings are supplied ready to use.

Finishes for Aluminum

Aluminum Co. of America, Dept. MF, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

A comprehensive and informative description of the innumerable ways in which the appearance and performance characteristics of aluminum can be changed is presented in a new 48-page four-color book, "Finishes for Alcoa Aluminum," which demonstrates the versatility of aluminum in presenting the myriad of colors and appearances which make aluminum the metal with a thousand faces. The book opens with descriptions of the basic characteristics of aluminum finishes. Texture, for example, may make a favorable impression on eye and hand; and the many ways in which aluminum can be uniquely textured are presented in text and photographs. Attractive colors, particularly when combined with metallic luster are eye-catching. Other characteristics which receive special mention in the book are reflection, durability and surface hardness.

An outline of finishing methods makes up a major portion of the book, and illustrates the application of specific finishes to products and structures. This outline of the important methods of finishing aluminum is not an operating manual but will help the reader to a better understanding of the salient characteristics of finishes and the equipment required. The methods described include: mechanical finishes; chemical finishes (etched, immersion coating, etc.); electrochemical finishes; electroplating; and paint, lacquer and enamel (including vitreous enameling).

The book closes with a description of the reesarch and development services offered by the company to help customers adapt aluminum finishes to their needs.

Copies of the new book are available by writing on company letterhead to the company.

Rust Preventives

Daubert Chemical Co., Dept. MF, 333 N. Michigan Ave., Chicago 1, Ill.

A new rust preventive use chart, No. 255, describes the characteristics of a number of Nox-Rust rust preventive oils and compounds. Also listed are those products currently in use for machine tool lay-a-way and other government contracts requiring preservative packaging.

The chart also contains the table of preservatives as given in MIL-P-116C (proposed) and will serve as a handy reference for purchasing agents or packaging engineers engaged in preservation of metal products.

Plastic Equipment

Atlas Mineral Products Co., Dept. MF, Mertztown, Pa.

An eight-page bulletin on rigid plastic fabrications and pipe outlines the use of Type 1 polyvinyl chloride in

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FOR ALL BARREL AND STILL CYANIDE SOLUTIONS

- Yields a faster, brighter finish
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the fabrication of exhaust systems, process equipment, and processing tanks. Resistance characteristics and physical properties of the plastic are included in the section.

Also included in this comprehensive bulletin is a section on plastic pipe and fittings. Description and tables on chemical and physical properties of Type 1 and 2 polyvinyl chloride and styrene copolymer rubber resin blend rigid plastic pipe is included.

Vitreous Enamel on Aluminum

Vitreous Engineering, Monarch Aluminum Mfg. Co., Dept. MF, 9210 Detroit Ave., Cleveland 2, O.

Vitreous Enamel on Aluminum Castings, the first new development in a major finish for castings in over five years, is detailed in a brochure just published. Results of tests conducted are detailed in the new brochure. Advantages of vitreous enamel as both a colorful finish and abrasion resistant protective coating are outlined. Technical data offers design engineers information that will provide a preliminary basis for investigating product applications.

Rubber-Cushioned Abrasives

Brightboy Industrial Div., Weldon Roberts Rubber Co., Dept. MF, 95 N. 13th St., Newark 7, N. J.

A new catalog just issued lists the entire line, all wheels and accessory products which are available in many sizes of either aluminum oxide or silicon carbide grains, in combination with soft, firm or tough rubber binders. The catalog may be obtained gratis from distributors, or direct from the above company.

Coated Abrasives Film

Behr-Manning Division, Norton Co., Dept. MF, N. Y.

"Coated Abrasives Belts Speed Metalworking Production" is a 27-minute sound-and-color close-up (104 application scenes) of the newest finishing developments in the fast moving coated abrasives technology. The methods, machinery and product applications shown will give the viewer an up-to-date problem and solution session aimed at cutting finishing cost per piece. Applications range from offhand contour and standard lathe work but concentrate mostly on semi-automatic operations. Work materials include ferrous, non-ferrous and nonmetallic; shapes include contour, cylindrical, flat and sheet products. Prepolishing techniques are strikingly demonstrated. Film prints (16 mm, sound, color, 27-minutes) are available to foremen groups, plant production training classes, technical societies and college engineering and trade school groups, on application to the above company.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

New York Branch

The April 15th meeting at the Statler, New York was called to order by *A. Fusco*, president, and the minutes of the last meeting were read and approved.

There being no other business, the meeting was turned over to *Dr. E. Saubestre*, librarian who in turn presented *Robert Gore* of Metal and

A barrel load of bright nickel with a nickel's worth of

NICKELITE

CORROSION RESISTANCE UP 30% TO 100%

With Nickelite you can get 13 to 22 hours of salt spray exposure with 0.00006 inch of barrel nickel, instead of 11 to 13 hours. Actual salt spray tests show even greater improvement with thicker deposits. And you're saving money, too!

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INDUSTRIAL FINISHING EXPOSITION — CLEVELAND

Concentrated to quadruple strength — you don't ship, store or handle water! Shipping weight cut 275% — no deposits, no carboy returns. Stable, efficient, easily stored, easily used — a capful of Nickelite is enough for a barrel load of nickel.

Platers Research Corporation

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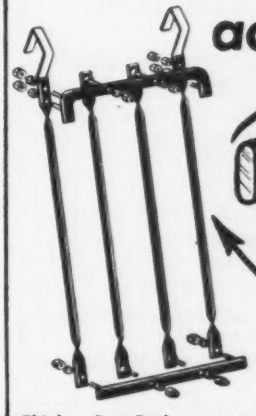
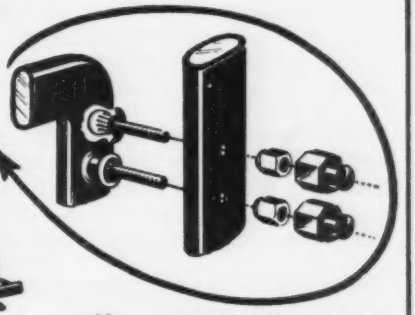
Plating Racks you can adjust to the job





Thinker Boy Racks are assembled from precoated members and tips. BELKE Vac-Seal Assembly seals the joints—only contact tips are exposed to the solution. Racks are easily disassembled without damage to coating.

Available as completely assembled racks or precoated rack members and tips.

Send for literature.

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When Thinker Boy Racks for a certain job are no longer needed you can respace the members or disassemble and use the parts for other racks.

No added investment. Just order Thinker Boys when you buy racks. Instead of ceilings cluttered with no longer needed racks, you'll soon have a supply of Thinker Boy Parts — be able to assemble coated racks of your own design in a matter of minutes. Ask your BELKE Service Engineer or write for details.

Belke MFG. CO., 947 N. Cicero, Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS

Thermit Corp. Assisted by *Bennett Brooks*, he gave a talk entitled "Some Practical Aspects of Tin and Tin Alloy Plating." His talk, well illustrated with many slides, covered the plating of tin, tin-nickel, tin-zinc, and tin-copper. The value of alloy plating in producing coating of great variety of properties was stressed. Considerable discussion was given of the problem of handling anodes in tin and tin alloy baths. This discussion was highlighted by color slides of the appearance of properly filmed anodes. There was a lively question and answer period, followed by the distribution of operating manuals covering all of the plating processes mentioned in the talk. The meeting closed with a rising ovation to Mr. Gore for a fine talk.

Lester Levinson,
Recording Secretary

Buffalo Branch

On Friday, April 1, 1955, *Clifford Struyck* of the General Chemical Division Allied Chemical & Dye Corporation discussed the applications of fluoboric acid and fluoborate plating solutions in the plating industry.

Announcement was made of the branch picnic on July 30 at the Kendall Club grounds on Chautauqua Lake, N. Y. Tickets for the event are ready and may be secured from branch members.

The following were admitted to membership:

Wallace C. L. Rosdahl, Wilber C. Fullerton, J. Raymond Kilroy, Fred O. Goeckel, Wallace A. Keefe, Donald R. Pembridge, Harry W. Critzer.

The following were elected to office for 1955-1956:

President — *A. A. Janis.*
1st Vice-President — *R. F. Hofmann.*
2nd Vice- President — *B. B. Joffe.*
3rd Vice-President — *H. Fudeman.*
Secretary — *E. G. Sampson.*
Treasurer — *R. E. Campbell.*
Librarian — *F. Rudolph.*
Sergeant-at-arms — *W. Hart.*
Board of Managers: *J. A. Moneypenny, L. A. Davis, H. A. Day.*
Delegates to 1956 Convention: *J. A. Moneypenny, S. T. Bush, J. Ruft.*
Alternate Delegated to 1956 Convention: *W. M. Fotheringham, H. A. Day, L. A. Davis.*

Eric G. Sampson, Jr.,
Secretary

Head and Wysong Candidates For A.E.S. Office

Herberth E. Head, past president of the Detroit Branch, is a candidate for National Third Vice-President of the *American Electroplaters' Society*. He has been a delegate to the National Convention for the past 15 years and has served on committees handling all the industrial finishing expositions.

A graduate of St. Frances Academy

Herberth E. Head

KER-CHRO-MITE COATINGS for ZINC and CADMIUM

Ker-chro-mite #4 — Gives a mirror-like finish to dull-plated work; protects against corrosion and is stain resistant; with a minimum of care it outperforms other coatings in clarity, uniformity, versatility and reproducibility.

Olive Green — A stable solution which produces an excellent Army Green which will pass all Government specs for zinc or cadmium; gives positive protection against corrosion, and is ideal as a base for paint or dyes for high protective colored finishes.

Jet Black — A moly black for high protection and a rich black finish.

Brighteners — Barrel brighteners for zinc or cadmium which feature superior luster, excellent throwing power and are very economical.

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Plating engineering service • Equipment and supplies • Control test kits for zinc, cadmium, nickel, brass and copper plating baths.

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★ 50 to 50,000 Amperes DC
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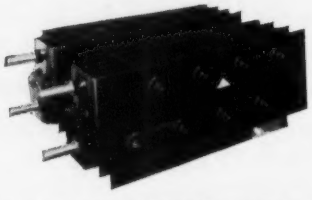
Two styles available—1. Selenium for cool zones, or 2. Magnesium copper sulphide for the hot, dirty jobs. Units still running after 4 years of constant duty.



Replacement Rectifier Stacks for Lektron or Udylite-Mallory

Magnesium copper sulphide rectifiers make your plating power supply more rugged and dependable. Magnesium radiator fins for fast heat dissipation and lighter weight. Matching pairs.

Model 4045—750 amps at 12 volts DC—1500 amps. at 6 volts DC. Operates on 208, 220 or 440 A.C. Weight 525 lbs. F.O.B. Indianapolis, Indiana.

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in Owensboro, Kentucky, he is employed as a supervisor of electroplating and related operations at the Automotive Body Div. of Chrysler Corp.

Mr. Head resides at 5547 Fairview Ave., Detroit 13, Mich.

Ralph D. Wysong, past president of the St. Joseph Valley Branch, is a candidate for National Third Vice-President of the American Electroplaters' Society. He has been a Branch delegate to all National Conventions since 1943, was a member of the Planning Committee for the 1952 convention, and chairman of one session at that convention.

Ralph D. Wysong

A graduate of Purdue University, he is employed as a chemical engineer in charge of finishes at the Studebaker Div. of Studebaker-Packard Corp.

Mr. Wysong resides at 3511 Chevy Chase, South Bend, Ind.

Indianapolis Branch

The April 6th meeting was well attended with thirty-seven members present for dinner and meeting. The usual opening procedure followed with introductions, secretary's and treasurer's reports. President *Elmer Lundberg* announced that *Herb Kennedy* and *Frank Hartwig* will be the branch representatives on the Tri-State Regional committee. Mr. Kennedy said Mr. Hartwig was appointed secretary of the group for this coming year. The next committee meeting of the group will be held at the Cleveland convention. The 1956 Tri-State meeting will be in Dayton, Ohio on March 10th. The 1957 meeting will be in Indianapolis. Reports followed on the April 23 annual educational session and dinner dance. *Frederick Anderson* reported on the TV script and it was decided to table this for the time being.

One new member was voted into the society in a motion by Mr. Reynolds and seconded by *Jack Vaughan*. He was *Fred L. Brower* of Guide Lamp in Anderson, who resided at 625 Washington Court, Anderson. The motion was carried. *Ed Bruck* announced that the Indianapolis invitation for an Interim meeting is still acceptable by the national officers. Mr. Reynolds suggested that the delegates take a stand on the candidate to back for the coming election. The president asked that this be continued at the May meeting. Two members, *Al Kriese* and *Francis Thomason* were reported ill and cards are to be sent to them by the secretary.

The program was to be a panel discussion by three of the members who are *John Holland*, *John Hood* and *Mrs. Jeanetta Peacock*. As Mr. Hood could not attend, this was carried on by the other two members. The subject was Testing Plates and Plating."

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You send us sample of metal used. We will return finished sample together with compound for your specific requirements. Speed up productions with correct compositions.

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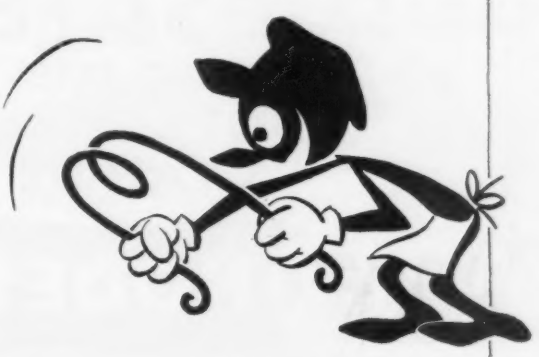

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Easy to make up in the first place! Easy to repair years later! That's Monel! It's strong, too . . . and handles pickling acids with ease. Learn more about lightweight Monel equipment in free booklet, "5-Way Savings in Pickling."

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extra capacity
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INCO Monel Pickling Equipment

Lengthy discussion followed as to the salt spray testing, appearance tests, etc. Many questions were asked by the group and the meeting adjourned at 9:30 P.M.

Edna Rohrabaugh,
Secretary

Newark Branch

Following the customarily well attended Dutch Treat at the Robert Treat and a film depicting automatic barrel plating by an F. B. Stevens automatic line, the April 15th meeting of the Newark Branch was called to order by President Austin. Roll call found all officers present except *William Grigat*, *John Gumm* and *Dodd Carr*. *Daniel Marino* of Keuffel & Esser and *James J. Shyne* of Vitro Laboratories were elected to membership and the applications of *William Ross* of Bart Messing Co., *Charles Smith* and *Albert Nortoff* of Hanson-Van Winkle-Munning Co. were accepted.

Past Presidents' pins were presented to *Louis Donroe*, *George Klink*, *Robert Sizelove* and *George Wagner*, who were absent from the March meeting, by *Edward Faint*, a charter member of the Society. The board of managers was appointed by President Austin to audit the books for the year 1954-1955. The meeting was then turned over to Librarian *Gustav Bittrich* who introduced *Dr. Karl Schumpelt* of Forstner Chain Co. His timely topic was recent developments in precious metal plating. He pointed out that there has been little real development in recent years. Silver plating from bright baths was claimed to lack the jewelers finish and warmth required by the trade, while being at the same time harder and more difficult to buff. In the field of gold plating, the speaker claimed a normal gold solution yields sufficiently bright deposits and that at least one new bright gold process is sufficiently bright to eliminate all post plating processing. New alloy baths are available but, because of legal complications, the market will not be too good. Alloy deposits may still fail to give uniform color over a wide range. In the field of platinum metals little work has been done. Rhodium plating is still done as heretofore. Platinum finds few users with the platinum diammino nitrite being used now. Palladium is less used than ever, but there is some new interest and the chloride nitrite bath is the one of most appeal. Ruthenium is being pushed again, the ruthenium nitroso chloride formula being used.

Barnet Ostrow of Lea-Ronal, Inc. then discussed "Bright Silver Plating." He reviewed the history of silver plating and pointed out that really bright processes were of recent origin. Mr. Ostrow pointed out the many possible organic impurities that may be elaborated in a silver bath and emphasized the need for carbon purification to remove these impurities. He also noted the need to oxidize sulfidic sulfur and that KIO_3 (patent application) was useful in removing this contamination. He discussed the advantages of the potassium formulation, claiming faster speed for the potassium bath and the possibility of roughness from the sodium bath as the result of carbonate buildup. Mr. Ostrow also discussed the deposition of heavy coatings of silver and the need for carbon treatment as well as the maintenance of the silver strike. the many questions posed after the meeting testified to the general interest of the group in the two talks.

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Twin City Branch

At the April meeting the following officers were elected to office:

President — *Fred Kaim*, Superior Plating.

1st Vice-President — *Robert Teply*, Northwest Airlines.

2nd Vice-President — *Roy Bierman*, Minneapolis-Honeywell.

Librarian—*Warren Johnson*, Northwest Airlines.

Sec. Tres. — *Robert L. Buckley*, Industrial Chem. and Equip.

Board Members — (at large).

George Reed, Minneapolis - Honeywell.

Cort Platt, Midland Coatings.

Ben Rosenthal, Wyandotte Chemicals.

Following the board meeting and dinner an interesting talk on "Specifications and Tests for Electrodeposited Coatings" was given by *C. H. Sample* of the International Nickel Co. An ordinarily dry subject was delivered in an extremely interesting manner by the speaker. The control of knowledge on the subject by the speaker made it a general interest subject for all. Following the talk a lively question and answer session was held.

Attending the meeting as guests were: *Chas. Kupelian* and *Jens Hall* of the Jostens Co. and *Verne Robinson* and *Jack Neves* of the International Nickel Co. *A. G. Russel*, Western Electric Co., was welcomed as a transfer member to the Branch.

Grand Rapids Branch

The April 1, 1955, meeting was attended by 30 members. The attendance was low, due to moving the meeting ahead one week. President *Carl Green* opened the business meeting by greeting all members and extending a special greeting to *Henriette Fikse*, the only lady attending. Secretary *John Dykstra*, read the minutes of the previous meeting. President Green gave the annual report covering membership, and the financial condition of the branch. He then proceeded to introduce the incoming new officers for the 1955-56 fiscal year. The new slate of officers are as follows: *Perry Burnham*, president; *Bob Blackford*, 1st vice-president; *Tom Henner*, 2nd vice-president; *Don Smith*, secretary; *Pat Norton*, treasurer; *John Dykstra*, librarian; *Paul Waalkes*, assistant librarian. The members of the Board of Managers are, *Carl Green*, as past president, *Jack Hanney*, and *Lyman Speery*.

President Elect Burnham then took over the meeting and presented Mr. Green with the Past President's pin.

L. E. Cole was elected to membership and *Chet Borlet* was transferred into the branch. *Mr. Dykstra*, the new librarian, introduced the speaker for the evening, *John A. Swift*, president and technical director of Swift Industrial Chemical Co., Canton, Conn. Mr. Swift's subject was "What The Plater Should Know About Metallurgy." His talk covered the manufacture of steel, elements that are added and their function. His talk was illustrated with slides of microphotographs. A question and answer discussion followed and Mr. Swift's talk was concluded with a rising round of applause. The regular social hour followed.

Baltimore-Washington Branch

The annual educational session was called to order by President *Benderly* in the New York Room of the Statler Hotel, Washington, D. C., at 2:15 P.M., March 12, 1955.

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POLISHING & PLATING
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ness was the appointment of *Dr. Vernon Lamb* and *Vincent Hughes, Jr.* as a committee to nominate the branch officers for the coming year.

President Benderly then introduced the guests, *Dr. Ralph A. Schaefer*, president and *P. Peter Kovatis*, executive secretary, AES.

Following a few remarks by Dr. Schaefer, the meeting was turned over to Librarian *Jules Horelick* who introduced the speakers, the first being *Dr. H. C. Kellner*, Lea Mfg. Co., who spoke on "Brite Copper Plating." This was a review of the improvements in cyanide copper solutions from the rochelle salt bath to the fully bright solutions in use today. Second to speak was *C. S. Hague, Westinghouse Corp.*, who discussed design, construction and operating characteristics of germanium rectifiers. Both of these speakers gave an excellent presentation of their respective subjects.

After a short recess *Walter Pinner*, Houdaille-Hershey Corp., gave a splendid report on the work that has been and is being done to develop a reliable corrosion test for plated coatings.

Judging by the amount of questions asked of each of the speakers there was considerable interest about all three subjects.

The evening was spent dining and dancing with the ladies. The dinner was highlighted with the presentation of a Pot to Dr. Schaefer. AES Past President *Ken Huston* made the presentation.

Carl H. Thiede,
Secretary

Cincinnati Branch

Thirty-eight members and guests were called to order at 7:30 p.m. by *Bill Gordon*, president, on April 27, 1955. Mr. Gordon immediately turned the meeting over to *Will Loveless*, librarian, who introduced the speaker for the evening, *Myron Ceresa*, of Westinghouse Electric Corp., Pittsburgh, Pa. Mr. Ceresa covered the topic of PR Cyanide copper plating, outlining its advantages, necessary equipment and materials, types of baths available, solution operation and control, common troubles with their correction. It was an interesting and thorough presentation, and many members had questions to ask of Mr. Ceresa.

The business meeting was then opened and *Ed Roof* presented the revised by-laws and constitution of the Cincinnati Branch for discussion and approval by the membership. Ed pointed out the few changes which had been made in the original by-laws, and the fact that there were few questions or objections testifies to the thoroughness of his committee's preparation. *Robert Miller* moved that the by-laws be accepted as outlined by the committee and the motion was carried by the membership.

Changes in the delegates to the national convention in June were then announced by President Gordon, with the new slate of delegates as follows:

Delegates: *Bill Young, Robert Rarick, Bill Stephenson.*

Alternates: *Russ Waters, Bob Miller, Chuck Wise, Bill Gordon.*

The application for admission of *E. H. Maus* was presented to the membership, and they indicated their approval.

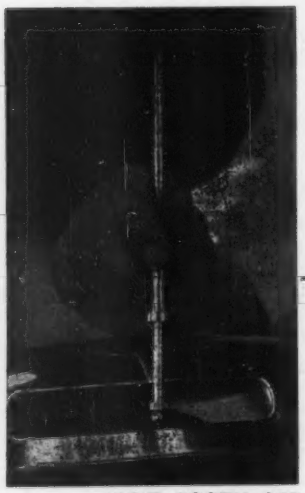
The annual election of officers was the next item on the business docket. *Bob Miller*, chairman of the nominating committee, presented a slate of

A magnetic thickness tester ...

POCKET HANDI-GAGE

FOR ELECTRODEPOSITED, HOT DIPPED OR PAINTED COATINGS ON STEEL

Tests thicknesses from 0.0001 to 0.015 inch. Each individual gage is separately calibrated to National Bureau of Standards thickness plates, resulting in an accuracy to 10% for thicknesses over 0.0002 inch. As simple to use as an automobile tire gage, the Pocket Handi-Gage may be used on the production line or in the lab. It's perfect as a "Go, No-Go" thickness gage at the plating tank or spray booth.



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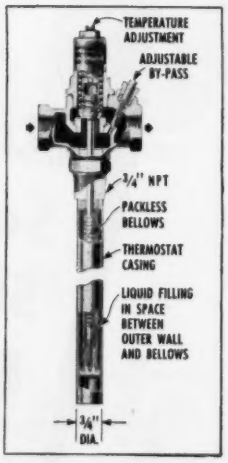

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candidates for the various offices. President Gordon asked for further nominations from the floor, and there were none. Since there was no competition for the offices of president, first vice-president and second vice-president, it was moved and passed that their election be considered unanimous. Balloting was then begun for the remaining offices, with the following result:

President — *Robert K. Rarick.*
First vice-president — *Edwin Roof.*
Second vice-president — *W. Wilson Loveless.*
Librarian — *C. E. Foertmeyer.*
Secretary — *Richard K. Evans.*
Treasurer — *Gordon T. Speers.*

The gavel was then turned over by ex-president Gordon to the new president, Bob Rarick.

Following this business meeting, the social hour was sponsored by Diamond-Alkali Company.

L. J. Howald

Louisville Branch

The regular monthly meeting of the Louisville Branch was held Thursday, March 17, 1955, at Kapfhammer's Party House, 1506 South Shelby St., with a dinner served at 6:30 p.m. President *J. W. Schnoll* opened the business and open meeting at 8:00 p.m., with twenty-two members and guests present.

William W. Francis, chairman of the exhibit committee, reported that the committee and members decided not to contribute to the Exhibit for the AES National Convention to be held in Cleveland, June 20, 1955 this year.

Arthur A. Oertel reported that he was unable to attend the Tri State Regional Meeting as a delegate at this time. *James R. Smith* was appointed to substitute for him as a delegate.

Stanley J. Beyer, chairman of the nominating committee reported the following as candidates for office for the new fiscal year, April 1, 1955, to April 1, 1956:

President — *William W. Francis.*
1st Vice-President — *Kenneth C. Reifsteck.*
2nd Vice-President — *Stanley J. Beyer.*
Sec'y & Treasurer — *Joseph G. Sterling.*
Librarian — *John S. Houston.*
Sergeant-at-arms — *John Kehrer.*

A call was made for nominations from the floor and none were received. It was moved and seconded that the nominations stand approved.

New members are *Norris D. Shake*, Clayton & Lambert Mfg. Co. and *William P. Radcliff*, 3742 Avon Ct., Louisville.

Librarian, Stanley J. Beyer introduced the speaker, *D. S. Roland* of the Sarco Co., Inc., New York City, who gave an excellent 'down to earth' talk on "Temperature Control of Electroplating Processes." Mr. Roland's talk was mostly on the types of automatic temperature control of solutions by using heating and thermocouple devices.

Although the simplest devices are the on and off types of instruments, much better service was obtained from the automatic instruments. Some of the instruments were discussed in detail.

After an interesting question and answer session, all gave Mr. Roland a

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rising vote of thanks and the meeting adjourned at 11:00 p.m.

William W. Francis,
Acting Secretary

Central Michigan Branch

The annual business meeting and election of officers of the Central Michigan Branch was held at the Porter Hotel in Lansing, Mich. on April 12, 1955. The first item of business was the election of a new board of directors comprised of 8 members. Those members elected to this board are: *E. J. Bosca, R. L. Carter, William Mogle, F. Young, F. Stuckenburg, L. Reiman, G. Woodruff*, and *R. W. Boos*.

The new Board of Directors elected the following officers for 1955-56:

President — *R. L. Carter*.
1st Vice-President — *F. Young*.
2nd Vice-President — *L. Reiman*.
3rd Vice-President — *R. W. Boos*.
Secretary-Treasurer — *E. J. Bosca*.
Librarian — *D. Trafelet*.
Research Chairman — *F. Gurnham*.
Publicity — *G. Woodruff*.

The following members were appointed delegates to the AES National Exposition in Cleveland, *F. Stuckenburg, U. Forsyth*, and *H. Marsh*. Alternates appointed are *William Mogle, E. Bosca*, and *R. W. Boos*.

Additional plans were discussed and made concerning the exhibit for the National Exposition, it being decided to assemble all exhibit parts at the May meeting to be held in Jackson, Mich.

Through the courtesy of Eastern Air Lines a movie entitled "Flying with Godfrey" was shown.

R. W. Boos,
Publicity

Chicago Branch

Friday the 13th did not dampen enthusiasm for members of Chicago Branch, during their April meeting in the club rooms of the Western Society of Engineers. The meeting was well attended and the speaker of the evening, *Milton Pleva*, sales engineer for the Ransburg Electrocoating Corp., was well received. Mr. Pleva presented a very interesting sound-movie on "Electrostatic Spraying." This interesting subject was illustrated in a film showing the development and applications of the firm's processes. Following the showing of the film, Mr. Pleva, who covers the Chicago area for Ransburg, very competently answered questions.

During the question period which immediately precedes the general meeting, a panel of experts consisting of: *Gene Gryglas*, Cinch Mfg. Co., *Klem Petrosius*, Superior Plating Works, and *Herman Miller*, Automatic Electric Co. answered questions on the current problems experienced by various branch members. These question periods are always helpful, not only to the member who asks the question but to others who have had similar problems.

Other activities of the branch include a meeting of the librarian's committee, consisting of *Russ Harr*, Chairman, *R. Scott Modjeska, Don Chiz* and *Matt Dassinger* at which a program for the coming year was outlined and should be ready for publication by their next meeting.

Ladies' night, April 1, at Algauer's, brought out 210 members and their ladies, the film after the meal was well photographed and equally well received.

Marion Longfield installed the officers for the coming year and his wife, Marian, was wished a "Happy Birth-

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day" in song by the assemblage.

At a meeting in the offices of the Chicago Electroplaters' Institute, the subject of a research program on buffing was discussed. If members of any other branches have ideas on this subject to present they will be welcomed.

Los Angeles Branch

By unanimous vote of the membership, *Don Bedwell*, plant superintendent of the Hallenschied-McDonald Co., Los Angeles, was elected to honorary membership in Los Angeles Branch of the A.E.S. at the April 13 meeting.

Also approved unanimously was a proposal to instruct Los Angeles delegates *Earl W. Arnold*, *Glen Beckwith* and *Truman Stoner* to submit Bedwell's name at the Cleveland convention for honorary membership in the Supreme Society.

Bedwell has had a notable career in the plating industry. He has been active as a shop owner, foreman of finishing departments and plant superintendent for some four decades. He was a charter member and a leading spirit in the organization of the branch in 1929; was branch president for two terms, and served frequently as chairman of the board of managers, national delegate, and as a leader in AES activity on the West Coast.

Two Los Angeles members on whom the Supreme Society had conferred honorary membership in the past were the late *Ernest Lamoreaux* and *Frank Rushton*.

The branch also took active steps to have the 1960 convention assigned to Los Angeles. On motion of *G. Stuart Krentel*, the branch's delegates to the 1955 convention in Cleveland were instructed to make a formal application for the 1960 conclave. A special booster meeting was to be called before the delegates leave for Cleveland to prime them with information and material which would lend emphasis to the Los Angeles bid.

As his final task as vice-president and membership chairman before being installed as the new president. Mr. Arnold rendered a report on the branch's membership status. The report revealed that while a substantial number of new members were acquired during the 1954-55 fiscal year, the total of new members was exactly balanced by the number of those who withdrew during the year, leaving the branch with the precise total it had a year ago—264. Those figures did include six members whose applications had already been approved, and 11 others with applications awaiting processing.

Tony Stabile, chairman of the Research Committee, made a stirring appeal for contributing memberships. He reported that, with the receipt of a membership from *John Millhorn* of the Millhorn Chemical & Supply Co. of Los Angeles, the branch had a total of 15 supporting memberships. Stabile deplored that total as inadequate for a branch with 264 members and urged the various large supply houses and manufacturers not currently on the list, to "come through" with a research membership this year.

Earl Coffin served in his traditional roll as master-of-ceremonies at the induction of the new officers elected at a previous meeting, and thereafter turned the gavel over to the new president, Mr. Arnold.

James Hodges, *Fernandez Alvarez*, *Everett Elgin* and *Al Trott* were initiated into membership. Applications

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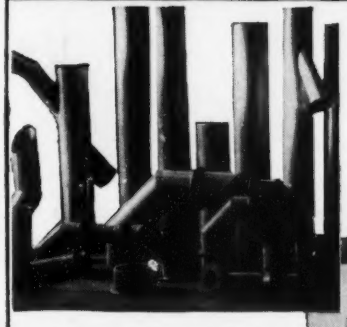

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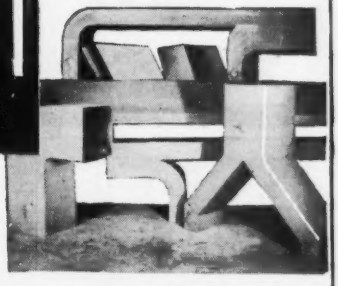

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were received from eight others. The transfer of *E. C. Bosel* from Chicago to Los Angeles Branch was approved.

The speaker at the April 13 meeting was *E. H. Babcock*, senior metallurgist of Convair Aircraft, Pomona, Calif. Mr. Babcock, a member of Chicago Branch, spent many years in the plating department of the Ford Motor Co.'s Engine Division in Chicago, and drew upon that experience for a discussion on plating as used on airplane engines.

Zinc Institute Elects Directors

At the annual meeting of the American Zinc Institute on April 28 the following directors were elected for the term ending 1958: *H. D. Carus*, Matthiessen & Hegeler Zinc Co., La Salle, Ill.; *C. M. Chapin, Jr.*, St. Joseph Lead Co., New York City; *M. L. Havey*, The New Jersey Zinc Co., New York City; *R. G. Kenly*, The New Jersey Zinc Sales Co., New York City; *S. H. Levison*, American Smelting & Refining Co., New York City; *F. S. Mulock*, U. S. Smelting, Refining & Mining Co., Boston, Mass.; *R. F. Orr*, Athletic Mining & Smelting Co., Fort Smith, Ark.; *O. A. Rockwell*, Eagle-Picher Co., Mining & Smelting Div., Miami, Okla.; *C. H. Winship, Jr.*, Phelps-Dodge Corp., New York City; and *H. L. Young*, American Zinc Sales Co., St. Louis, Mo.

News from California

By Fred A. Herr

Carroll McLaren of the Santa Ana Plating Works, Santa Ana, Cal., holds two records of which he is justifiably proud. His presence at the 25th annual educational session of Los Angeles Branch of the AES on March 19 marked his 24th consecutive appearance at that event. The second record is his unequalled prowess as a raconteur. On March 19, for the third consecutive year, Carroll won first prize in the annual Los Angeles Branch story telling contest. There is a movement underway to award first prize to Carroll next year without bothering to call him to the microphone.

It was one of those vertical affairs, some 2 feet high, with a 12 inch diameter plated tray at the top. Taylor explained that the plating department of the Climax Machine Co. in Indianapolis, Ind., in which he worked in 1931, was the first plating plant in the country to do decorative chromium on stand-up ash stands. That year (1931), Taylor said, was only three years after decorative chromium had been introduced in Detroit. Reminiscing a bit, he explained that Climax Machine Co. went in for some decorative plating of ash stands as one method of carrying through the depression which, in 1931, was just getting underway.

The sequence in the Climax shop 24 years ago was: cleaning, copper plating, nickel plating, buffing (there was no bright nickel then), and chromium plating for two minutes. Taylor has been active as a plater since 1924,

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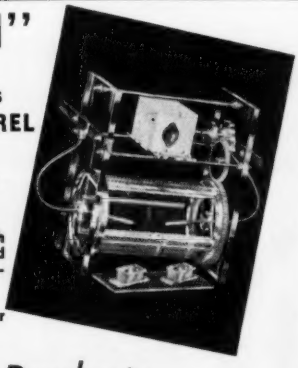

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in the mid-west and Southern California.

Glen J. Beckwith, vice-president and general manager, Metallon Products, Inc., Los Angeles, was scheduled to leave early in June for an extended trip to call on representatives of Metallon Products and Technical Glass Co. of Vernon, Calif. His schedule called for visits to Dallas and Fort Worth, Tex., Miami, Fla., Charlotte, N. C., New York, Chicago, Detroit, and a stop at Metallon's mid-west plant in Canfield, Ohio, before arriving in Cleveland, where he will serve Los Angeles Branch as a delegate to the A.E.S. convention. He planned to stop in Kenosha, Wis., Cedar Rapids, Iowa, and Denver, Col., on the return trip.

Conferences with executives of the Harper Buffing Machine Co. in Portland, Conn., concerning a new automatic buffing unit destined for installation in the finishing plant of Hallenscheid-McDonald, Los Angeles, was the objective of a recent trip taken by *Don Bedwell*, Hall-Mak plant superintendent, and *Bud McDonald*, assistant superintendent.

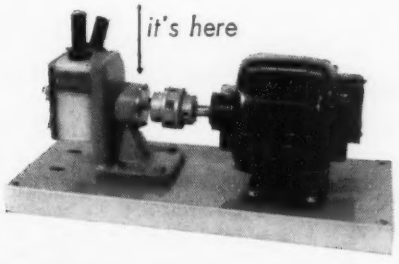
Don and Bud (who was recently promoted to the assistant superintendent's post) spent ten days in March and April visiting Chicago and Portland, Conn., among other cities. Installation of the new automatic is part of a major realignment of finishing equipment in the Hall-Mak plant at 1344 W. Washington Blvd., Los Angeles, with an eye to achieving more streamlined production. The new machine is intended for use on high-production buffing of die-cast bathroom fixtures. Installation is expected to be completed by mid-June. And on May 4, Don and Mrs. Bedwell were to board the S. S. Lurline at Los Angeles Harbor for their long anticipated trip to the Hawaiian Islands.

Freeman Taylor, plating foreman of the California Metal Processing Co., Los Angeles, acted like he met an old friend when he came upon a chromium plated stand-up ash stand at the Ambassador Hotel during a recent meeting of Los Angeles A.E.S. Branch.

Ralph Alexander, technical engineer for North American Aviation in Inglewood, Calif., for the past eight years, has joined the plating engineering staff of United States Spring & Bumper Co. in Los Angeles. U. S. Spring & Bumper, recently taken over as a subsidiary of the Rheem Mfg. Co., operates a plating department equipped to do copper, nickel and chromium plating on bumper parts. Full automatic bright nickel facilities are used for finishing bumper parts; and semi-automatic for bumper rails.

After 28 years of operation in the same plant at 1723 Riverside Drive, Los Angeles, the Los Angeles Water Softener Co., Inc., recently moved to new and larger quarters at 1007 Air Way, Glendale, Calif.

Forced to move because of a freeway planned for the old location, the company purchased property formerly occupied by the Babb Co. of Glendale and added a new welding shop. The new plant provides triple the floor area of the old. The company was established in Los Angeles in 1927 by *Paul L. Wynhausen* when he transferred his business from South Bend, Ind. Today it ranks among the largest



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of its type in Southern California and has representation throughout the United States, Latin America and the Far East. It serves the demineralized water needs for the plating, and various other industries. In addition to zeolite softeners it produces hot process softeners, floc treaters, deaerators, filters, chloride dealkalizers, degasifiers and demineralizers. Mr. Wynhausen and his son Nate serve in the chief executive capacities for the firm.

The Norton Co. of Worcester, Mass., abrasive and grinding wheel manufacturers, has moved its Los Angeles district offices from 4890 South Alameda St., Los Angeles, to 5905 Pacific Blvd., Huntington Park, a Los Angeles suburb. *Robert W. Cushman* serves the company as west coast district manager.

George W. Slomin & Associates, consultants in electrochemistry and electrothermics, has moved research facilities from San Diego, Calif., to new laboratory quarters at 725 North Western Ave., Los Angeles.

George W. Slomin, head of the group, reports the new laboratory and research facility is fully equipped for metal finishing research and development and research in advanced electrothermics.

George W. Slomin

Associated with Slomin are *David Schneiderman*, electronics engineer, and *Mitchell Christensen*, metallurgical engineer. Slomin has been affiliated as chief chemist, chief electrochemist and process engineer with such firms as the Stewart Warner Corp. and Wahl Eversharp Corp., Chicago; Hughes Aircraft Co., Tucson, Ariz.; Rohr Aircraft Co., Chula Vista, Calif.; and Librascope, Inc., Glendale, Calif.

John Bermingham has been promoted from the sales staff to acting sales manager for the E. F. Houghton Co.'s western division, with headquarters in San Francisco. He replaced *W. A. Fletcher*, who is on the sick list. Bermingham is active in San Francisco area metal organizations. He served as chairman of the Northern California Chapter, American Society for Metals, and currently holds the chairmanship of the local chapter of the American Foundrymen's Society.

Kay C. Blin recently joined the staff of the Los Angeles Water Softener Co., Glendale, Calif., as industrial sales engineer. A long-time resident of Chicago, Blin left the employ of Industrial Filter & Pump Co. to make his home in Southern California. With the Los Angeles Water Softener Co., he will work with *Gene Schmidt*, technical director, and serve accounts in

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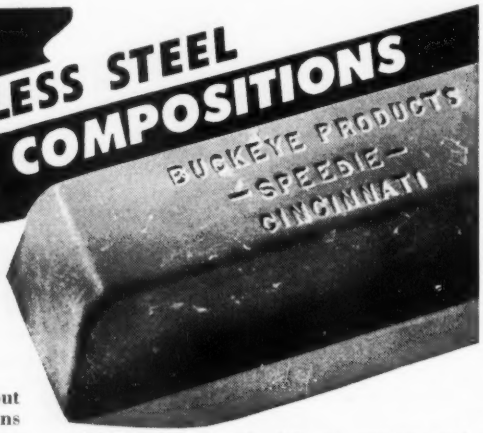

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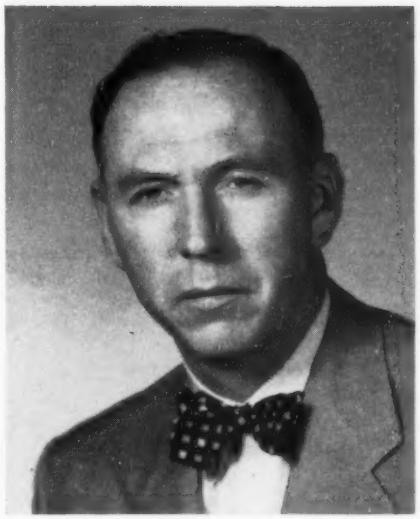

Kay C. Blin

the Los Angeles County area. Blin was educated at the university of Illinois in metallurgical engineering. He has arranged to transfer his membership in the A.E.S. from Chicago to Los Angeles Branch.

Harold Smallman, director of the Southern California Branch of Hanson-Van Winkle-Munning Co., reports the transfer of *E. C. Bosel* from Chicago to the technical stales staff in Los Angeles.

The Chemical Division, General Electric Co., recently opened a western regional office for decorative plastic sales. Headquarters are in the Russ Building, San Francisco, with *Charles E. Whitman* as regional sales manager.

Fire caused by an explosion in mid-April in the plant of the Diamilite Abrasive Co., 2301 Main St., Santa Monica, Calif., damaged the factory and several adjoining industrial structures to the extent of some $35,000. Exploding drums of plastic solvent added to the difficulty of fighting the flames, from which a 1000-foot column of smoke mushroomed skyward.

Another new Californian who is transferring from Chicago AES Branch to Los Angeles Branch is *E. H. Babcock* who has joined the staff of Convair Aircraft in Pomona, Calif., as senior metallurgist. He was formerly with Ford Motor Co.'s engine division in Chicago, in charge of plating aircraft engines.

Arcadia Metal Products Co., announces that ground will be broken in June for a new $500,000, 50,000 square foot factory and office building in Fullerton, Calif., for use in the manufacture and finishing of metal building items.

Lear, Inc., Santa Monica, Calif., reports completion of a three-phase plant expansion program which involved construction of additional facilities for its plants in Santa Monica, Grand Rapids, Mich., and Elyria, O.

New buildings of 52,000 and 20,000 square feet area were erected in Santa Monica to house offices and main facilities of the Lear-Cal, and research and development divisions, which produce aircraft radio communications, and navigation equipment. At Elyria, O., new construction provided 2200 additional square feet for the Lear-Romec division. At Grand Rapids, Mich., a 58,000 square foot building was erected for use by the Lear Grand Rapids Division's aircraft service department.

Construction is underway on a new 24,000 square foot plant at the intersection of E. Washington Blvd. and Santa Ana Freeway in Los Angeles to house expanded manufacturing facilities for the Potentiometer Division of Fairchild Camera & Instrument Co. *Lee Griswold*, assistant manager of the Potentiometer Division, has been named manager of the Los Angeles factory.

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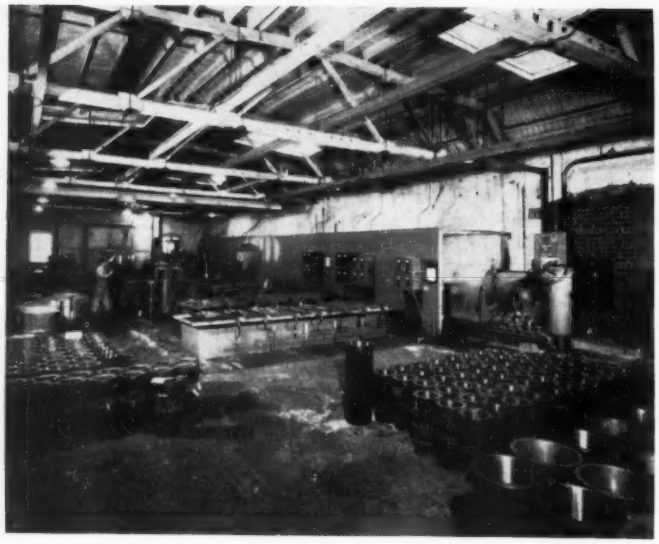

General view of the new iron plating department which includes ten tanks in which diesel engine liners (on floor, in foreground) are given an under-plate prior to porous chromium plating.

Spar-Tan Engineering Co. has completed an $150,000 enlargement program at its plant, 2445 Enterprise St., Los Angeles, Calif. The program involved the acquisition of an 11,000 sq. ft. building adjoining the main plant on the west to house enlarged porous and hard chrome departments; and a new iron plating department.

The most extensive phase of the expansion program concerned the installation of a new and larger iron plating department. This division now occupies a 50 x 125 ft room at the eastern end of the main factory.

It has been equipped to provide the company with enlarged facilities for applying the Vanderloy M iron plating process on railroad diesel liners as an underlayer for porous chromium when such liners are too badly worn to be brought back to standard specifications with chromium alone.

The installation program involved ten tanks, eight 4′ x 3′ x 6′, one 6′ x 3′ x 12′, and one 6′ x 3′ x 14′. A 30 hp. steam boiler, 10 rectifiers, two filters, and heat exchangers were also included in the new equipment.

The new building on the west has

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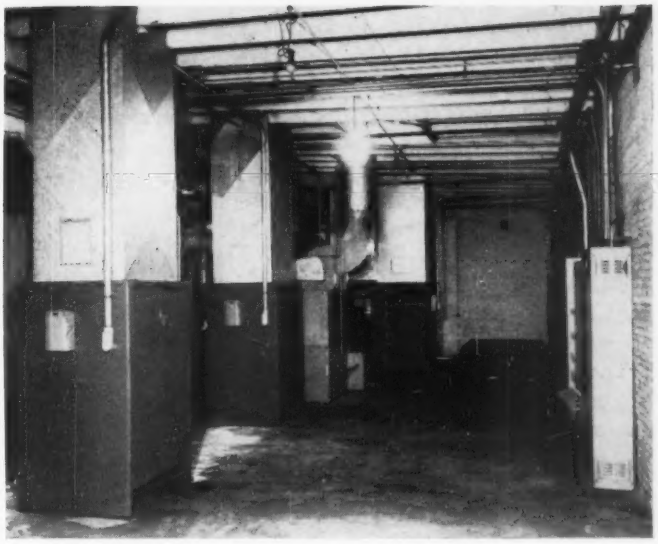

This bank of rectifiers was installed to service an addition to the company's porous chromium plating facilities which in January of this year were increased with two new lines. The firm operates with a total of 36 rectifiers, and 24,229,000 ampere hours per month are required for the current volume of work.

been equipped with two new porous chromium lines to supplement an existing line of nine tanks. Each of the new lines, which were placed in operation in January, 1955, consists of a plating tank, rinse tank, and a bank of rectifiers. The hard chromium plating department was enlarged by the addition of another line consisting of plating and rinse tanks, and rectifiers. The appropriation allocated for new equipment in the chromium divisions alone was in excess of $60,000.

Because of the extremely close tolerances required in the control of DC current output and the flexibility desired in this new setup, Spar-Tan ordered four 5,000 ampere, 8 volt rectifiers, and four 1,500 ampere, 8 volt rectifiers, with the following characteristics.

Each rectifier provides automatic regulation of either the DC voltage or DC current output. By merely turning a selector switch, the units may be converted from automatic current stabilization to automatic voltage stabilization. When on automatic voltage stabilization, it is possible then to parallel the output of all six rectifiers, giving a total of 26,000 amperes at eight volts. Each unit has built-in current limit so that it is impossible

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to overload the rectifiers when in the parallel position. With this arrangement, the company may plate individual liners at uniform current limit so that it is impossible to overload the rectifiers when in the parallel position. With this arrangement, the company may plate individual liners at uniform current density by having constant current regulation, or it can plate on or more large pieces, using constant voltage.

The new facilities make Spar-Tan Engineering the largest user of chromic acid in the West.

NEW BOOKS

Principles of Emulsion Technology

By Paul Becher. Published by Reinhold Pub. Corp., 430 Park Ave., New York 22, N. Y. 1955. Price $2.95. 149 pages including index.

One of the publisher's "pilot" books, the page size is only 4½" x 7" but the book is complete in essential information on the fundamentals of emulsion technology. General principles are presented in terms of practical examples and modern equipment is described and illustrated. The volume is for those who have studied chemistry and are interested in furthering their knowledge of dispersions and emulsions, emulsifying agents, surface activity and demulsification.

Metal Cleaning Bibliographical Abstracts

Prepared by Jay C. Harris. Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 1954. Price: $1.50, paper cover. 48 pages.

The 1953 edition was a combined publication of all references from 1842 to 1951. This 1954 supplement brings up to date the published data on metal cleaning with the inclusion of 227 new references. These references are arranged by year and also by author or by journal and, wherever possible, the original articles have been abstracted. In some cases, however, articles are re-abstracted. The supplement, together with the original edition may be obtained at a combination price of $5.25.

Protective Coatings for Metals

By R. M. Burns & W. W. Bradley. Published by Reinhold Pub. Corp., 430 Park Ave., New York 22, N. Y. 1955. Price $12.00. 610 pages plus index.

ACS monograph No. 129 is the second edition of Burns' famous reference volume, which first appeared 16 years ago. Greatly enlarged and almost entirely rewritten, this new edition contains expanded sections on organic coatings; completely new chapters on corrosion inhibitors, chemical conversion coatings and sprayed metal coatings; full explanations of "silver migration" and "metallic whiskers"; latest practice in metal cleaning, coating application and testing; and an enormous amount of other up-to-date information on corrosion and its prevention.

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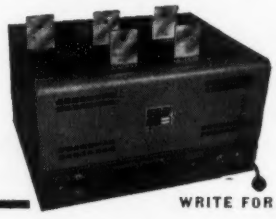

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No other book so fully satisfies the requirements of metal finishers on this important subject of corrosion control, both from the theoretical and practical standpoints, and it should be considered a must for the technical library.

1954 Supplements to Book of ASTM Standards

Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 1954. Price: $3.50 per part, paper cover.

Part 1, Ferrous Metals, includes 89 new standards in its 608 pages. Of interest to the finisher would be the standards for metallic coated steel products. Part 2, Non-Ferrous Metals, includes 81 standards, covering 444 pages. This section contains the well-known standards on electrodeposited metallic coatings, corrosion tests and general methods of testing.

There are five other parts to the series of 1954 suppliments. However, except for Part 4, which covers paints, among other organic material standards, these books would not be considered of interest to the metal finisher.

OBITUARIES

DANIEL J. FINUCANE

Daniel J. Finucane, 61 years old, who had been connected with the copper and brass industry since 1911, manager of the New York sales district of *Revere Copper and Brass Inc.*, died at 7:45 A.M., Sunday, April 3rd, at the Long Island College Hospital, Brooklyn, following a recent operation. His home was at 182 Maple Street, Brooklyn.

Mr. Finucane had been with the company since 1929. He had been manager of New York District merchandise sales from 1929 to 1946, when he was made manager of the New York Sales District.

Born in Brooklyn, Mr. Finucane was graduated from the Brooklyn Commercial High School in 1911 after which he entered the employ of U. T. Hungerford Brass and Copper Co., New York City (now a part of Chase Brass and Copper Co.) where he remained until the formation of Finucane and Macfie. He had served as a corporal in the United States Marine Corps during World War I.

Mr. Finucane was a member of the Uptown Club, New York, Montauk Club, Knights of Columbus, and the Lefferts Manor Assn.

He is survived by his widow, *Katherine N. Finucane*, a son, *Dr. Richard D. Finucane*, Boston, a daughter, *Mrs. H. H. McDade, Jr.*, Ossining, N. Y., and three grandchildren, *Katherine Finucane, Elizabeth Ann McDade* and *Janice Ann McDade*.

JOHN M. COOK

John M. Cook, 60, a pioneer in developing the abrasives industry, died

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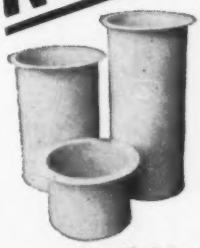

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April 14 at Beech Grove Farm, his home in Johnsonville, N. Y. He was vice-president and general sales manager of *Behr-Manning Division* of *Norton Company*, and a director of both those companies.

Mr. Cook was widely known throughout the abrasives trade and its user industries. Among the first to recognize the importance of the distributor in marketing coated abrasives,

John M. Cook

he was largely instrumental in building his company's far-flung distributor organizations. As an inspirational sales leader, he devoted much of his energy in recent years to developing young salesmen.

A salesman throughout his adult life, he had sold for Norton and the Manning Abrasive Co. before the latter company became Behr-Manning in 1928. There he filled increasingly important posts, operating the newly formed jobbing division from 1932 to 1935 and becoming manager of general trade sales in 1948. He was elected to the Behr-Manning directorate in 1949, made assistant manager of the abrasives division the following year, and had served as vice-president and general sales manager since 1952. He became a director of Norton early in 1954.

He is survived by his wife, Hazel T. Cook.

LETTER TO THE EDITOR

Metal Finishing
Westwood, New Jersey

Attention: Nathaniel Hall
Technical Editor

Dear Sir:

Attention is called to the article on page 86 of the April issue (Electroplating Laboratory Presented to Illinois Institute of Technology). The third paragraph states that IIT is the first institution to offer an electroplating laboratory as well as courses on the subject of electroplating. I feel that there is some error in this statement. Michigan College of Mining and Technology has had a protection coating laboratory in use for a good number of years. This includes an electroplating laboratory and supplements the theoretical studies in the electroplating field.

Very truly yours,
C. Evans Foertmeyer,
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500	6	Chandeysson
500/250	6/12	Elec. Prod.
500/250	6/12	Optimus
635	55	Elec. Prod.
640	39	West.
750/375	6/12	Excel
940	32	Elec. Prod.
1000/500	6/12	H-V-W
1500	13	Columbia
1500	30/50	Century
1500	40/65	G. E.
1500	70	Century
2000/1000	6/12	H-V-W
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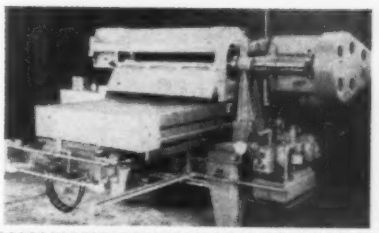

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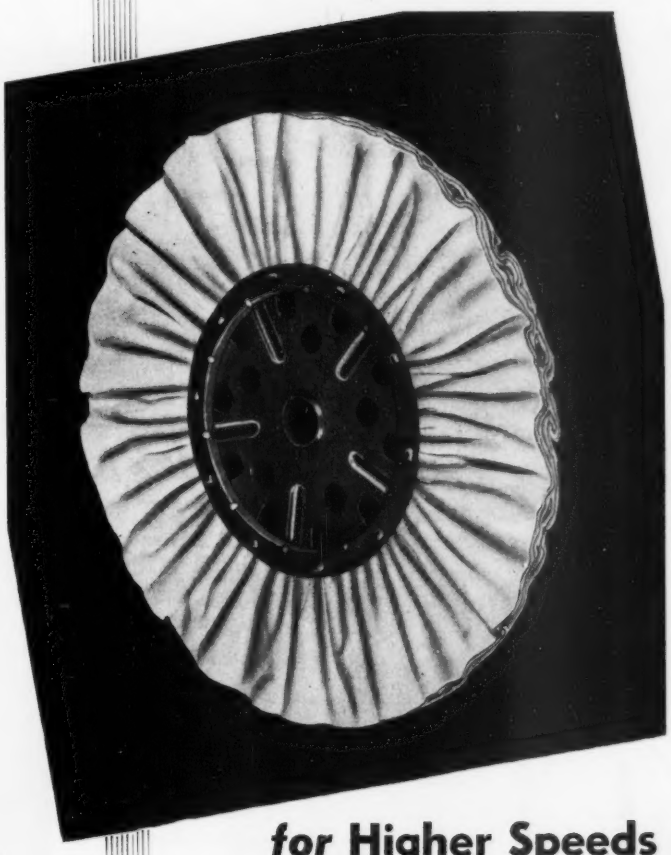

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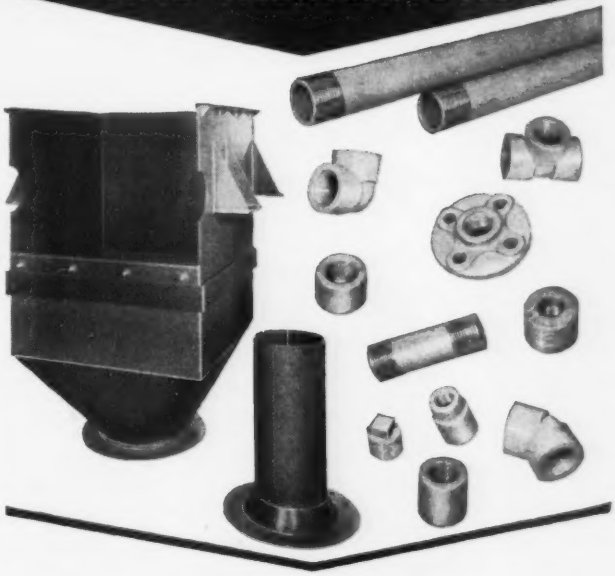

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- ★ *Readily Formed, Machined, Drawn, Molded or Welded*

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Efficient LOW-COST operation with either ANNULAR bag element or POROUS STONE.

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MIRROCU copper bright dip. LUSTRABRASS brass bright dip. M-601 burnishing compound. DB Electrolytic Strip for electrodeposits. Paint Strippers. Etch Salts for acid dipping leaded brass. METEX A-82 dip to prevent staining. Cleaning Compounds for all cycles.

ZINC BASE DIECASTINGS

METEX diecast burnishing compound. Special Soak Cleaners for heavy buffing compound removal. METEX DB Electrolytic Strip. Paint Strippers. TROXIDE for acid dipping.

ALUMINUM

ALUMETEX Process for plating on aluminum. MACDERMID ALUMINUM BRIGHT DIP. METEX #79 liquid burnishing compound. Pickling Aids for silicon alloys. DEOXIDEX Process preparation for spot welding. NON-ETCH anodize strippers. METEX SS STRIPPER for removing copper, nickel and cadmium. Paint Strippers. Cleaning compounds for all processing.

GENERAL SPECIALTIES

MACDERMID BRIGHT COPPER Plating Process. CHROMETEX nickel activator prior to chrome plating. Alkaline Zinc Stripper. Acid Additive for pickling solutions. METEX FILTER POWDER. Phosphoric acid cleaners and deoxidizers. Materials for chemically machining aluminum. Plating and stripping processes for printed circuits. Acid dips for Pewter. ROCHELTEX additive for all cyanide copper solutions. Paint and carbon removers. Rinsing aids to prevent staining and assist water shedding. Stainless steel cleaning and pickling cycles for chromium plating. Burnishing and pickling aids to remove scale from stainless.

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- #7 – PRESSURE SPRAY WASHING MACHINE CLEANERS
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